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Cost Accounting

By

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9

PREFACE

Cost accounting, as a vital factor of successful business administration, has, in the last few years, been brought home in various ways to many manufacturers who before had never seriously appreciated its importance.

The Federal Trade Commission, working for more stable conditions, has conducted a widespread campaign of education, explaining in detail what a cost accounting system is, how it is operated, and the resulting business advantages.

Various manufacturers' associations have first paid skilled accountants to devise cost-finding methods suited to their special trade conditions, and then have instituted a vigorous propaganda to induce all engaged in their own particular industry to adopt them, thus making these methods uniform in the trade and securing uniformity of selling prices and the end of reckless and ignorant price-cutting.

Now the government, with its need to levy war taxes and its consequent necessity for searching investigation into income and excess profits, requires that estimates and approximations as to production costs and profits shall give place to rational accounting systems giving actual figures by uniform methods.

As a result of this pressure and the more intelligent education in accounting given by the better modern schools, cost accounting has become the rule in all intelligently conducted industries, and its methods have been extended to many establishments other than manufacturing industries.

Under these circumstances it has been found necessary to bring out this volume as an extension of Nicholson's "Cost Accounting, Theory and Practice" published in 1913, making the work more comprehensive, and bringing it in all respects up to the latest practice. In its preparation the authors have kept constantly in view the following aims:

First, to classify the details of cost accounting so that the reader, be he accountant, manufacturer, or student, is given a well-defined idea of the forms and records required for each separate operation and of how these forms and records fit into the general system used in the particular establishment. The need for such a classification has many times been brought to the attention of the authors by points raised during conferences with manufacturers.

Second, to present additional and specially important data, such as the comprehensive table of depreciation rates on pages 146 *et seq.*, and the classification of and distinction between asset and perishable tools on pages 509 and 510. Definite information of this kind based on standard practice solves many of the perplexities which arise when such arbitrary matters as depreciation and classification are left to individual judgment with its tendency to be biased by the current statement of profit and loss.

Similar problems and difficulties have arisen in interpreting the terms of the numerous government contracts made during the war period and their cancellation at the time of writing. Therefore, the present work is brought up to date by a detailed discussion of what may be chargeable to such contract work and what compensation the contractor may be entitled to on the cancellation of a fixed price, a fixed profit, or a cost-plus contract.

Acknowledgment is hereby made to Lieutenant-Colonel M. F. Griggs and Captain J. P. Carlin of the Ordnance Department, U. S. A., for their valuable contributions to the discussion of depreciation rates; also to the editorial staff of the Ronald Press Company for their careful revision and helpful suggestions as to form and arrangement of manuscript.

THE AUTHORS

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CONTENTS

Part I—Elements and Methods of Cost-Finding

CHAPTER PAGE

I COST-FINDING AND ITS FUNCTIONS 1

Changing Social and Industrial Demands
Phases of Efficiency Progress
Importance of Cost-Finding
Functions of Cost Accounting
Cost Accounting as Related to General Accounting
Objections to Cost Systems
Advantages of Cost Systems
Application of Cost Principles
Uniform Methods of Cost-Finding

II ELEMENTS OF COST 13

Manufacturing Costs
Direct Material
Direct Labor
Direct Expense
Indirect Charges
Packing Expense
Selling Expenses
Administrative Expenses
Selling Price
Deductions
Analysis of Elements of Cost

III GENERAL METHODS OF COST-FINDING 24

Requirements of Cost-Finding

ORDER METHOD OF COST-FINDING

Distinctive Features of Order Method
Construction Work
Repair Shops
Plating Shops
Cabinet Shops
Garment Manufacturing Plants
Straw and Felt Hat Plants
Boot and Shoe Plants
Wood-Working Plants
Metal-Working Plants
Assembling Departments

PROCESS METHOD OF COST-FINDING

Distinctive Features of Process Method
Foundries

CHAPTER PAGE

Paper Mills
Paint and Varnish Manufacturing Plants
Chemical Manufacturing Plants
Rubber and Celluloid Manufacturing Plants
Manufacture of Foodstuffs
Coal-Mining
Ice Manufacturing Plants
Treating Departments
Cutting and Machining Department—Wood-Working Plants
Summary of Cost-Finding Methods

IV DEPARTMENT AND PRODUCT CLASSIFICATION . . . 35

Factory Departments
Productive Departments
Designation of Departmental Divisions
Non-Productive Departments
Miscellaneous Departments
General Operating Expenses
Summary of Departmental Classification
Classification of the Product

Part II—Factory Routine and Detailed Reports

V FACTORY ORDERS 45

Function of the Factory Order
Inadequacy of Verbal Orders
Written Factory Orders
Kinds of Factory Orders
Production Orders—Classification
Designation of Quantities
Sub-Production Orders
The Grouping of Small Orders
Special Production Orders
The Production of Parts and Finished Stock
Repairs to Product Orders
Miscellaneous Factory Orders—Classification
Construction Orders
Betterment Orders
Repair Orders
Standing Orders
Order Numbers
Summary of Factory Orders
Designing Factory Orders
Issuance and Authorization
Number of Copies
Simple Form of Factory Order
Development of Factory Order
Filing and Final Disposition of the Factory Order
Sales Orders
Registering Sales Orders

CHAPTER PAGE

VI MATERIAL AND MATERIAL REPORTS 65
Procedure in Handling Material
Purchasing the Material
Purchase Requisition
Purchase Order
Register of Purchase Orders
Filing of Catalogues, etc.
Receiving the Material
Receiving Record
Report of Material Received
Invoices from Creditors
Storing Material
Bin Records
Record of Raw Material
Issuance of Material
Material Requisitions
Bill of Material
Credit for Material Returned
Disposition of Issued Material
Report of Material Used
Interdepartmental Material Reports
Pricing the Material
Inventorying the Material
Summary of Material and Material Reports
Procedure in Handling Records

VII WAGE SYSTEMS 98
Kinds of Wage Systems
Day-Rate System
Piece-Work System
Differential-Piece-Rate Plan
Premium and Bonus Systems
Contract System
Profit-Sharing and Stock-Distributing Plans

VIII LABOR REPORTS 108
Classification of Labor
Outside and Inside Labor
Direct and Indirect Labor
Direct Labor Reports
Time of Reporting Labor
Method of Reporting Labor
Requirements of Labor Reports
Form of Time Report
Pay-Roll Exception Report
Labor Transfer Reports
Rate Records
Summary of Labor Reports
Procedure for Handling Reports

IX DEPARTMENTAL APPLICATION OF OVERHEAD 126
Classification
Indirect Material

CHAPTER PAGE

1. Material Which Cannot Be Applied as a Direct Charge
2. Supplies
3. Scrap or Waste Material
4. Small Perishable Tools and Dies
Indirect or Non-Productive Labor
1. (a) Cost and Idle Time of Productive Workers
1. (b) Time of Helpers, Sweepers, Truckers
2. Supervisors and Foremen
3. Superintendence
4. Inspection, When Not Considered as a Direct Labor Charge
5. Factory Clerks' Salaries
6. Employees on Defective Work
7. Employees on Experimental Work
Indirect Expenses
1. Rent
2. Insurance—Fire and Liability
3. Taxes
4. Interest
5-7. Power, Light, and Heat
8. Freight and Cartage Inward
9. Over, Short, and Damage Account
10. Miscellaneous Factory Expenses

X DEPRECIATION AND MAINTENANCE 144
Depreciation
Effect of Repairs and Renewals on Depreciation
Factors to be Considered in Fixing Rates
Schedule of Depreciation Rates
Basis of Standard Rates
Group Rates
Rates for Special Machinery
Method of Charging off Depreciation
Difference between Amortization and Depreciation
Legal Definition of Depreciation and Amortization
The Effect of Overtime on Depreciation
Limit of Maximum Percentage for Overtime
Abnormal Depreciation and Amortization
Maintenance, Repairs, and Renewals

XI DISTRIBUTION OF FACTORY OVERHEAD 163
Direct and Indirect Distribution of Overhead
General Operating Expenses
Methods of Distributing Overhead
1. Prime-Cost Method
Calculation of Prime-Cost Rate
Advantages and Disadvantage
Conditions under which Inapplicable
2. Productive-Labor-Cost Method
Applicability of Labor-Cost Method
3. Productive-Labor-Hours Method
4. (a) Machine-Rate Methods
Method of Compiling Machine Rate

CHAPTER PAGE

4. (b) Fixed Machine-Rate Method
4. (c) Sold-Hour Method
5. Miscellaneous Methods
Fixed Versus Fluctuating Rates
Adjustment of Factory Overhead
Summary of Factory Overhead

XII FACTORY OVERHEAD REPORTS 185
The Source of Overhead Items
Reports for Recording Indirect Material
Reports for Indirect Labor
Freight and Cartage Inward
Indirect Expenses—Fixed Charges
Maintenance, Repairs, and Renewals
Power Expenses
Over, Short, and Damage
Distribution or Analysis Record
Deferred Expense Record
Summary of Factory Overhead Reports

XIII METHODS OF REPORTING PRODUCTION 198
Purpose of a Production Report
Form of Production Report
Simple Production Reports
Production Reports Showing Progress of Product
Factory Orders as Production Reports
Tag and Coupon System of Production Report
Material Reports as Production Reports
Labor Reports as Production Reports
Defective Work Reports
Time of Reporting Production
Disposition of Product
Procedure in Handling Production Reports
Summary of Production Reports

Part III—Compiling and Summarizing the Cost Records

XIV COST SHEETS 211
Scope of Cost Sheet
The Job or Order Cost Sheet
The Process Cost Sheet
Information in Heading
Details Shown on Cost Sheets
Simple Form of Cost Sheet
Departmental Cost Sheets
Detailed Summary of Costs
Progressive Cost Sheet
Schedules of Estimated Costs
Posting Cost Information
Posting Material Reports
Posting Labor Reports

CHAPTER PAGE

Entering Overhead Costs
Entering Quantities
Mechanical Aids for Posting Costs
Checking Costs
Summary of Procedure
Method of Filing Cost Sheets
Summary of Method of Compiling Cost Sheets

XV STOCK RECORDS 231
Purpose and Kind
Method of Keeping Stock Records
Raw Material Stock Records
Work in Process Stock Records
Finished Parts Stock Record
Finished Stock Records
Simple Types of Stock Records
Records of Stock Available for Unfilled Orders
Consignment Records
Semi-Finished Goods Stock Records
Procedure in Handling Stock Records
Entering Inventory Balances
Posting Charges and Credits
Testing, Proving, and Adjusting
Loose-Leaf Versus Bound Stock Record
Obsolete Stock Record
Filing Stock Records

XVI SUMMARIZING RECORDS—CHARGING FACTORY EXPENDITURES 242
Purpose of Summarizing Records
Cost Period
Charging Factory Expenditures
Method of Handling Purchase Invoices
Purchase Record
Posting from Purchase Record
Accounts Payable Voucher
Voucher Register
Posting from Voucher Register
Advantages and Disadvantages of Voucher Register
Combination Voucher Register and Purchase Record
Distribution or Analysis Record
Summary of Material Received
Pay-Roll
Pay-Roll Analysis
Analysis of Charges to Jobs
Process Pay-Roll Summary
Summary of Salaries

XVII COST SUMMARIZING RECORDS—TRANSFERS WITHIN THE FACTORY 266
Kinds of Records
Summary of Material Requisitions
Summary of Departmental Material Used

CHAPTER PAGE

Summaries of Material Transfers
Summary of Departmental Transfers of Labor
Summary of Shop Order Costs
Summary of Defective Work Costs
Summary of Factory Overhead Distribution
Summary of Production

XVIII COST SUMMARIZING RECORDS—SALES, COST OF SALES, AND JOURNAL ENTRIES 276
Kinds of Records
Shipping Records, Sales Records, and Costing Sales
Sales Summary
Cost of Sales Summary
Return Credit Records
Returns Summary and Cost of Returns Summary
Costs and Sales
Journal Entries
Journal Vouchers and Standing Journal Entries
Chart of Cost Summarizing Records

Part IV—Controlling the Cost Records

XIX GENERAL LEDGER CONTROL OF FACTORY ACCOUNTS. . . 293
The Control of Cost Records
Income and Expense Accounts
Purchase Transactions
Pay-Roll and Analysis
Sales Transactions
Cash Transactions
Ledger Accounts
Merchandise Inventory
Controlling Factory Transactions—First Method
Controlling Factory Transactions—Second Method
Proving the Inventory Balances
Subdivisions of Controlling Accounts
Controlling Factory Transactions—Third Method
Factory Ledger Controlling Account in the General Ledger
Classification Chart of General Ledger Accounts
Arrangement of General Ledger Accounts

XX FACTORY LEDGER CONTROLLING ACCOUNTS 315
Methods of Keeping the Factory Ledger
Factory Journal
Raw Material Accounts
Postings to Raw Material Accounts
Work in Process Accounts
Postings to Work in Process Accounts
Form of Work in Process Account
Part-Finished Stock Accounts
Postings to Part-Finished Stock Accounts
Finished Stock Accounts

CHAPTER PAGE

Postings to Finished Stock Accounts
Productive Iabor Accounts
Factory Indirect Expense Accounts
Distributed Overhead Account
General Ledger Account
Summary of Factory Ledger Controlling Accounts
Classification Chart of Factory Ledger Accounts
Form of Factory Ledger
Arrangement of Factory Ledger Accounts
Verification of Controlling Accounts
Adjusting Discrepancies in Cost
Closing of Factory Ledger Accounts

XXI FINANCIAL AND FACTORY STATEMENTS 338
Time and Form of Preparation
Kinds of Reports
Reports to Executives
Balance Sheet
Profit and Loss Statement
Manufacturing Statement
Trading Statement
Statement of Merchandise Inventory
Statement of Changes in Plant and Equipment
Reports to the Sales Departments
Statement of Salesmen's Sales, Costs and Expenses
Statement of Production, Shipments and Inventory of Finished Stock
Daily Statement of Sales and Cost of Sales
Statement of Sales, Actual Costs and Estimated Costs
Statement of Obsolete or Slow-Moving Finished Stock
Reports to the Purchasing Department
Reports to Factory Superintendent and Production Manager
Statement of Costs and Production
Statement of Labor Statistics and Cost Averages
Statement of Obsolete Orders in Process
Statement of Factory Expenses
Statement of Machine Statistics
Summary of Financial and Factory Statements
Method of Presenting Statements
Disposition of Statements
Style and Ruling of Reports
Interlocking and Agreeing Reports
Time of Presenting Reports

XXII METHOD OF TAKING INVENTORY 377
Inventory Methods
Testing the Inventory
Inventory Adjustments
Inventory Sheet
Physical Inventories
Preparation for Physical Inventory
Instructions as to the Taking of the Inventory
Method of Taking the Inventory

CHAPTER PAGE

Method of Listing the Inventory
Method of Pricing the Inventory
Pricing Raw Material
Pricing Work in Process
Pricing Finished Parts and Finished Stock Items
Figuring, Checking and Proving the Inventory

XXIII PLANT ASSET RECORDS 391
Nature and Valuation of Plant Assets
Plant Asset Records
Purposes of Plant Record
Machines
Tools
Fixtures
Machine Parts
Dies, Molds, etc.
Records by Appraisal Companies

Part V—The Installation of a Cost System

XXIV GENERAL CONSIDERATIONS 399
The Cost Accountant
Work of the Cost Accountant
Cost Classification of Enterprises
Internal Problems Affecting Cost Installations
Fitting the Cost System to Existing Conditions
Red Tape
Reports for Executives
Summary of Cost Procedure
1. Charging the Factory
2. Receiving and Storing Material
3. Proving and Charging Pay-Rolls
4. Delivering Material to Operation
5. Computing Costs
6. Crediting Production
7. Distributing the Factory Overhead
8. Charging Production to Stock
9. Costing Sales and Shipments
10. Preparing and Posting the Summarizing Records
11. Proving Subsidiary Records
12. Preparing and Proving the Trial Balance
13. Preparing Factory and Financial Statements
Cost Systems
Forms for Cost Records and Reports
Presenting Report on Cost Systems

XXV INSTALLING A COST SYSTEM—EXAMINATION OF PLANT 414
Nature of Examination
Examination of an Existing Cost System
Efficiency Details
Procedure for Examination of a Plant
1. Product Classification

CHAPTER PAGE

2. Sales Department
3. Departments of the Factory and Manufacturing Processes
4. Foundry Department
5. Plating Room
6. Wood-Working Shops
7. Dry Kilns
8. Power Department
9. Packing Department
10. Shipping Department
11. Estimating Department
12. Cost Department
13. Factory Orders
14. Raw Material and Storeroom Requirements
15. Purchasing Division
16. Receiving Department
17. Storeroom
18. Labor and Labor Reports in Use
19. Factory Overhead Items
20. Production
21. Finished Parts and Finished Stock
22. Compiling the Costs
23. Cost Summarizing Records
24. Genera Accounting Records of Original Entry
25. General System of Accounting
26. Statements
27. Miscellaneous Information
Examination of Auxiliary Mechanisms
Method of Obtaining the Information

XXVI INSTALLING A COST SYSTEM—METHOD OF STARTING OPERATIONS 442
Preliminary Test of Records
Order of Procedure
Classifying and Reanalyzing the Beginning Inventory
Entering Inventory on Records
Proof of Entries
Handling Work in Process Items
Starting New Orders in the Factory
Overhead Distribution
Classification of Product, Departments and Accounts
Reports and Records

Part VI—Simplified Cost-Finding Methods

XXVII ELEMENTARY COST SYSTEMS 451
Valuation of Closing Inventory
Method of Preparing Statements
Advantage of Percentage Method
Percentage Method Applied to Several Product Classifications
Unit Method of Figuring Costs
Applicability of Unit Method
Proof of Records

CHAPTER PAGE

XXVIII ESTIMATING COST SYSTEMS 459

Special Features of Estimating Method
Method of Operating System
Summary of Procedure
Development of System

VERIFICATION OF TOTAL COSTS—FIRST METHOD

Special Records Required
General Ledger Accounts
Method of Verification

VERIFICATION OF MATERIAL, LABOR AND OVERHEAD ESTIMATES—SECOND METHOD

Special Records Required
Analysis of Inventory
Operation of Ledger Accounts
Method of Verification

VERIFICATION OF COSTS BY SEVERAL LOTS OR GROUPS —THIRD METHOD

Special Records Required
Raw Materials Costs
Labor Costs
Overhead Costs
Opening Inventory Analysis
Operation of Ledger Accounts
Method of Verification

VERIFICATION OF COSTS BY OPERATING DEPARTMENTS —FOURTH METHOD

Special Forms Required
Ledger Accounts Opened
Charges for Expenditures
Crediting Production
Recording Cost of Sales
Method of Verification
Adjusting Differences in Inventory

XXIX UNIFORM COST METHODS 481

The Advantages of Standard Methods
Examples of Haphazard Methods
Method of Standardizing Costs
Details to be Considered

Part VII—Cost-Plus Contracts

XXX RECOMMENDATIONS OF INTERDEPARTMENTAL COST CONFERENCE 487

Work of Conference
Recommendations—Their Object
Fair Terms and Fixed Prices
Form of Purchase-and-Sale Contract

CHAPTER PAGE

Relations Established by Contract
Fixed Profit Plan
Adjustment of Fixed Profit
Standardized Forms and Methods
Summary of Recommendations
Normal Costs versus Total Costs

XXXI COST-PLUS CONTRACTS—MATERIAL, LABOR, AND EQUIPMENT ITEMS 496

General Consideration of Terms of Contract
Need of Special Rulings

BETTERMENTS AND EQUIPMENT

Treatment of Additions and Special Facilities
Treatment of Fixtures and Special Equipment
Office Furniture and Fittings
Rebuilding, Renovating and Equipment Charges
Freight or Express on Equipment
Setting Up Machines
Monorail System
Installing Workmen's Washing Facilities
Housing of Laborers

REPAIRS, RENEWALS AND REPLACEMENTS

Method of Treatment
Extraordinary Repairs

MATERIALS AND SUPPLIES ITEMS

Material Cost
Supplies
Pricing of Material and Supplies
Shortages, Overs and Obsolete Material
Inventory Adjustments
Drayage
Packing and Packing Supplies
Transfers of Inventory Items Between Factories
Spare Parts

TOOLS

Distinction Between Tools and Machines
Asset Tools and Perishable Tools
Scrap Value of Tools
Classification of Tools
Handling and Storing of Tools
Accounting for Tools
Asset Tools Charged at Cost
Perishable Tools
Old Tools Remade or Salvaged
Repairs or Replacement of Tools
Identification of Tools Used
Treatment When Basis of Contract is Changed

CHAPTER PAGE

OVERTIME AND IDLE TIME

Overtime
Idle Time on Operation
Waiting Time as a Deferred Charge

XXXII COST-PLUS CONTRACTS—EXPENSE AND OVERHEAD ITEMS 516

DISTRIBUTION OF OVERHEAD

Direct and Indirect Distribution
Distribution Over Periods of Less Than a Month
Overhead on Bulk Products

DEFERRED OVERHEAD CHARGES

Preliminary Expenses
Deferred Expenditures

ADMINISTRATIVE EXPENSES

Method of Treatment
Excessive Salaries
Salaries Paid After Termination of Employment

BONUS AND PENSION PAYMENTS

Bonus Payments
Pension or Compensation Indemnities

INSURANCE AND TAXES

Fire Insurance
Insurance Other Than Fire
Liability Insurance
Premiums for Life Insurance
Income and War Excess Profits Taxes
Government Taxes on Freight

INTEREST, DEPRECIATION AND DEPLETION

Interest as a Cost
Interest on Borrowed Money
Interest on Working Capital
Inventories
Interest on Plant, Machinery and Equipment
Depreciation and Interest on Plant Assets
Depletion
Method of Figuring Depreciation

GUARDING OF PROPERTY

Police Protection
Guard House
Guards' Uniforms, Badges and Other Equipment
Distribution of Protection Charges

MISCELLANEOUS EXPENSE ITEMS

Blue-Prints
Cash Discount

CHAPTER PAGE

Drafting Expenses
Defective Work
Experimental Expense
Employment Department
Intercompany Expenses
Patents and Royalty
Rental—Specific Charge for Same
Scrap and Waste
Selling Expense
Testing Expense
Training Employees Expense
Welfare Work

ERRORS AND LOSSES DUE TO CHANGES

Reclamation of Errors
Changes in Specifications

ITEMS NOT CHARGEABLE UNLESS STRICTLY APPLICABLE

Attorney Fees
Bad Debts
Brokerage Expenses
Donations and Entertainment
Real Estate Investments, Expenditures, etc.
Reserves
Engagement of Expert Services

XXXIII SUSPENSION OR CANCELLATION OF CONTRACTS . . 540

General Considerations

CANCELLATION OF FIXED PRICE CONTRACTS

Valuation of Inventory
Settlement of Commitments
Amortization
Plant Rearrangment
Experimental Work
Special Tools
Lease of Grounds or Building
Occupancy
Contract for Service
Organization Expense
Profits
Saving Clause in Contract

CANCELLATION OF FIXED PROFIT CONTRACTS

Difference Between Fixed Price and Fixed Profit Contracts
Saving Clause

CANCELLATION OF COST-PLUS CONTRACTS

Distinction Between Fixed Profit and Cost-Plus Contract

FORMS AND CHARTS

Elements of Cost

Form		Page
1.	Diagram Showing Relation of Cost Elements to Selling Price	20
2.	Chart Showing Analysis of Cost Elements	22

General Methods of Cost-Finding

3.	Chart Showing Methods of Cost-Finding Applied to Various Industries	33
4.	Classification Chart of Factory Departments	41

Factory Orders

5.	Classification Chart of Factory Orders	56
6.	Simple Factory Order	58
7.	Sales Order	62

Material and Material Reports

8.	Purchase Requisition	66
9.	Purchase Order	69
10.	Register of Purchase Orders	71
11.	Receiving Record	73
12.	Report of Material Received	75
13.	Invoice Stamp	77
14.	Bin Record	78
15.	Record of Raw Material	79
16.	Material Requisition	83
17.	Bill of Material	85
18.	Credit for Material Returned to Stock	87
19.	Report of Material Used	89
20.	Interdepartmental Material Report	90
21.	Inventory Test	93
22.	Inventory Sheet	94
23.	Chart Showing Handling of Material and Material Reports	96

Labor Reports

24.	Daily Labor Report	114
25.	Daily Piece-Work Report	115
26.	Job Ticket	116
27.	Pay-Roll Exception Report	117
28.	Labor Transfer Report	119
29.	Wage Rate Record	120
30.	Classification Chart of Labor Reports	121

FORM PAGE

FACTORY OVERHEAD REPORTS

31. Classification Chart of Factory Overhead 183
32. Schedule of Fixed Charges 191
33. Power Plant Distribution Record 194
34. Classification of Factory Overhead Reports 197

PRODUCTION REPORTS

35. Daily Production Report—Simple Form 199
36. Defective Work Report 205
37. Classification Chart of Production Reports 208

COST SHEETS

38. Process Cost Sheet 213
39. Cost Tag 216
40. Departmental Total Cost Sheet 216
41. Individual Departmental Cost Sheet 217
42. Complete Cost Sheet, Giving Departmental Details . . 219, 220
43. Progressive Cost Sheet 222
44. Calculation Blank Used in Garment Factory 223
45. Classification Chart of Cost Sheets 229

STOCK RECORDS

46. Finished Stock Record 235
47. Finished Product or Parts Stock Record 236
48. Finished Product Stock Record, Showing Filled and Unfilled Orders 237

SUMMARIZING RECORDS

49. Invoice Stamp, Covering Data for Purchase Record 244
50. Purchase Record 246
51. Accounts Payable Voucher 247, 248
52. Voucher Register 252, 253
53. Distribution or Analysis Record 256
54. Summary of Material Received 258
55. Pay-Roll Record 260
56. Pay-Roll Analysis 263
57. Summary of Material Requisitions 267
58. Summary of Shop Order Costs 271
59. Summary of Factory Overhead 273
60. Summary of Production 274
61. Shipping Order 277
62. Shipping Order Combined with Customer's Invoice, Sales Record and Cost of Sales Record 278, 279
63. Sales Summary 282
64. Cost of Returns Record Combined with Customer's Credit Memo and Office Record Memo 284, 285
65. Register of Sales and Costs 287
66. Journal Voucher 289
67. Standing Journal Entries Form 290
68. Chart of Cost Summarizing Records and Procedure 291

FORM PAGE

CONTROLLING ACCOUNTS

69. Classification Chart of General Ledger Accounts . . . 312, 313
70. Work in Process Account 321
71. Work in Process Account Showing Elements of Cost . . . 321
72. Factory Indirect Expense Account for Each Item 326
73. Factory Indirect Expense Account for Each Department . . 326
74. Summary Chart of Factory Ledger Controlling Accounts . . 330
75. Classification Chart of Factory Ledger Accounts . . . 323, 333

FINANCIAL AND FACTORY STATEMENTS

76. Comparative Balance Sheet 341
77. Profit and Loss Statement 344, 345
78. Manufacturing Statement 347
79. Comparative Statement of Merchandise Inventory 350
80. Statement of Charges in Plant and Equipment 351
81. Statement of Salesmen's Sales, Costs and Expenses 354
82. Statement of Production, Shipments and Inventory of Finished Stock 356
83. Daily Statement of Sales and Cost of Sales 357
84. Statement of Sales, Showing Profit or Loss on Special Items 358
85. Statement of Sales, Actual Costs and Estimated Costs . . . 360
86. Statement of Obsolete or Slow-Moving Stock 361
87. Statement of Merchandise Purchases and Inventory of Raw Materials 363
88. Statement of Obsolete Raw Material Items 364
89. Comparative Statement of Maximum and Minimum and Actual Quantities 365
90. Statement of Costs and Production 367
91. Statement of Labor Costs and Averages 369
92. Statement of Obsolete or Slow-Moving Orders in Process . . 370
93. Statement of Factory Expenses 371
94. Statement of Machine Costs 372
95. Chart of Financial and Factory Statements 374

INVENTORY RECORDS

96. Work in Process Inventory Sheet 380
97. Inventory Tag 385
98. Plant Asset Record 392, 393

ESTIMATING COSTS

99. Schedule of Total Estimated Costs 463
100. Summary of Estimated Costs of Sales 464
101. Analysis of Inventory 467

COST-PLUS CONTRACTS

102. Record of Tools Issued, Used and Scrapped 511

COST ACCOUNTING

Part I—Elements and Methods of Cost-Finding

CHAPTER I

COST-FINDING AND ITS FUNCTIONS

Changing Social and Industrial Demands

The importance of efficiency in business organization has never been so generally recognized as at the present time, and there is promise of even greater development in the future. One indication of this condition is the increased volume of literature that is now available on the subject. More than 90% of this literature has been published in the last decade, and fully 75% in the last five years.

The ultimate causes of this are to be found in the broad field of economics. The gradual absorption and development of natural resources, the exploitation of new fields of commerce, the increase of population, the higher standards of living, the greater complexities of demands in modern life—these are but a few of the innumerable influences reflected in the industrial life of today.

Transformed to some extent, these changes meet the manufacturer in the form of demands for more wages and better labor conditions, in the increased cost of materials, and in a much keener competition in every phase of manufacturing and selling. He must either adapt his methods to meet the situation, or retire from the field. Only one practicable road lies before him, and that is a keener realization of the existing

possibilities in his business. To be specific, he must eliminate waste of every kind and plan his organization so as to increase the production per unit of cost.

Phases of Efficiency Progress

This search for factory efficiency assumes many phases which overlap each other, more or less. From the mechanical standpoint, it involves a study of plant location and construction, new and better types of machines, economies in producing and using power, etc. From the labor standpoint, it has given rise to new and improved methods of wage payment, such as the differential rate plan and the premium and bonus methods with their various modifications, all of which offer increased pay for greater individual effort and efficiency. Even the motions and operations of the workmen are being analyzed as to their component parts, with the view of eliminating those which are unessential and wasteful of effort. While some of these methods are still novelties, the time is not far distant when most manufacturers will have to adopt them, or something similar, for their own salvation.

From the standpoint of factory organization, more has been attempted and accomplished than in almost any other direction, because the need has been pressing and immediate. The purpose is to bring the activities of the whole plant, no matter how widespread, under the direct review and control of the management. It is felt, and rightly so, that a considerable loss is incurred unless efficient systems and reliable statistics enable the management to keep in touch with the various steps of production, and to locate the responsibility for waste, lost time, shop errors, etc.

Quite as essential in its bearing on efficiency is the process of cost-finding; that is, finding just what it costs to manufacture a certain order or article. Not only is this necessary for the purpose of determining possible selling prices, but it

provides the ultimate measure by which manufacturing methods may be compared, and the best be thereby determined.

Importance of Cost-Finding

Through the Sherman Act, the United States Government prohibited manufacturers from agreeing on a uniform selling price. While this was a justifiable law and was necessary in order to curb combinations, at the same time it produced a certain amount of chaos because of the constant cutting of prices. There is, however, no law to prevent the introduction of a cost system or a uniform method of cost as applied to a certain definite industry, and the importance of this has recently been strongly emphasized by the government. The Federal Trade Commission, through the untiring efforts of its former chairman, Hon. Edward N. Hurley, in its work in connection with cost-finding, made a deep impression on the minds of manufacturers throughout the country as to the advantage and necessity of this branch of accounting.

Government investigations show that out of a quarter of a million business corporations in this country, the majority are making no profit, and that over 70% are making less than the salary of a good executive; furthermore, these statistics show that only 5% of the manufacturers know what their goods cost them to make. This statement does not mean that the manufacturer does not figure his cost, for every manufacturer, no matter how crudely it may be done, must do some sort of figuring on his cost in order to arrive at a selling price. The trouble, in the majority of cases, is that the manufacturer has no systematic method of figuring costs and has no way of proving his cost estimates after he has made them.

The need for better methods of cost accounting has been justified by the confusion which the government found exist-

ing at the outbreak of war in many of the trades in connection with this matter. It was necessary in case after case to establish, at an immense expense, a bureau and corps of experts to endeavor to find out the cost of manufactured products. All this trouble, waste of time, and expense would have been saved for the government, and much for the manufacturer as well, had there been proper methods of cost accounting in operation.

The war is over and the country at the present time is in a very prosperous state. A huge program of reconstruction along industrial and economic lines must take place. As stated by the Canadian Minister of Trade and Commerce: "The world is about to plunge into a trade and economic contest in which forces will assume totally new alignments; when competition will be keener and stronger than ever, and when science and organization will play a part in every successful rôle." The introduction of correct cost methods, backed by a sound organization, will enable the manufacturer to be prepared to meet his problems and to solve them intelligently when the time comes.

Functions of Cost Accounting

While the present book treats primarily of cost accounting, it would be a mistake if its scope were limited to finding costs only. Any good cost system, properly operated, performs two distinct though related functions:

The first, which may be called the direct function, is that of ascertaining actual costs. This should always be supplemented by the second, or indirect function—that of supplying, in its system of reports, the information necessary to organize the many departments of a factory into working units. In addition to this, it enables the activities of these units to be directed in accord with some definite plan designed to eliminate the inefficiencies in the various departments of the business.

Cost Accounting as Related to General Accounting

Cost accounting, as a science, is a branch of general accounting. Its province is to analyze and record the cost of the various items of material, labor, and indirect expense incurred in the operation of a factory, and so to compile these elements as to show the total production cost of a particular piece of work. With the cost books once established, the best modern usage is to incorporate their record in total in the general financial books. In this way the modern cost system builds up an interlocking series of accounts which furnish the basis for a detailed study of the operations of a manufacturing business.

The accounts which appear in the cost books, however, differ in nature and scope from those in the general financial books. The latter exhibit the complete record of the financial and commercial transactions of a business, whereas the former treat only of those transactions which deal with, and are properly chargeable to, the manufacture of the product. Like the general books, the cost records show the amounts spent for material, supplies, labor, and indirect expenses; but, in addition, there appear accounts with the raw material classifications, accounts with various operating departments, and accounts with the classifications of the finished and partly finished product. The last named accounts are those which make an analysis of costs possible.

Objections to Cost Systems

Arguments against cost systems have been presented so often that perhaps it may prove advantageous to review some of these so-called objections. They may be summarized under the five headings which follow:

1. Unique Business. The commonest objection set forth by a manufacturer who opposes cost systems is that his business is entirely distinctive, and that a cost system is absolutely

impracticable in so far as his particular industry is concerned. Of course, there may be a few exceptional industries where it is impossible to operate successfully a complete cost system with all of its ramifications. Some practical cost system, however, can be installed in every manufacturing industry. It may be that the most improved methods could not be installed in their complete form, but some of these advanced methods can be installed and can be made thoroughly practicable.

2. Cost of Installation. Cost systems are objected to on account of the excessive cost of their installation. This should be considered in the same way as any other investment—that is, the amount paid for the system should not be regarded alone, but its cost should also be considered in connection with the income-producing power of the system. "What is the system worth as a producer of profit?" is a far more important question than, "What did the system cost?"

3. Cost of Operation. In reviewing the objection that the cost of operating the system is excessive, consideration must again be given to the value of the system as a producer of income. If the advantages derived from the operation of the system do not compensate the manufacturer—that is, if it does not save more money than is paid for clerk hire, stationery, and other expenses incidental to its operation—the cost system either is a poor one or is not serving its entire purpose. Cost systems cannot be operated successfully without brains, and if the information disclosed by the reports of the advanced cost systems of today is not used in an efficient manner, the cost system is not serving its purpose as a "producer of profits."

4. Red Tape. The accusation that a cost system is always tied up with "red tape" is often made without being proved. What is meant by the term "red tape" depends to some extent upon the workings of the mind of the person using that expression. It may represent a violent prejudice

against cost-finding in general or against the number and kinds of forms and records which are necessary in the operation of the cost system and which the uninitiated regard as more or less superfluous.

As a matter of fact, most cost systems which have been properly planned and which are operated efficiently provide for numerous "short cuts" in summarizing the information for accounting purposes. Mechanical devices as an aid in the operation of cost systems have practically eliminated the so-called "red tape."

5. Failure of Numerous Cost Systems. It is a matter of record that a cost system frequently fails to give the results expected from its operation. The test of success or failure lies in the fact that it is or is not serving all of its functions, which include ascertaining true and accurate costs to be used as a basis for correcting irregularities and thereby "producing profits."

Numerous facts which may explain the failure in some instances of cost systems may be cited. These include:

(a) Impracticable system.
(b) Practicable system, improperly installed.
(c) Management not in sympathy with the work of systematizer.
(d) Opposition or lack of co-operation on the part of employees.

These are not to be considered as *excuses* for the failure of cost systems. They include only recorded facts which have accounted for failures. As a word of caution, therefore, it may be said that, before devising or installing a cost system, it is absolutely essential to secure the active support of the management so that all "kinks" may be overcome and all dissenters eliminated. Systems cannot be successful if they are installed against the wishes of the management.

Advantages of Cost Systems

The advantages of cost systems, with respect to increasing the efficiency of a plant from an organization standpoint, may be summarized under the following six headings:

1. Perpetual Inventory. The cost records provide for a perpetual inventory which furnishes information for the preparation of monthly statements showing the industrial and financial condition and the operating results of a company. These monthly statements should include:

(a) Balance sheet showing the financial condition of the company at the end of each month.

(b) Profit and loss statement showing the financial operations of the company during the month.

(c) Manufacturing statement, or statement of factory expenditures, showing the financial operations of the various departments of the factory during the month.

(d) Statement of salesmen's sales and costs showing the profit or loss of each salesman or territory of the country for the month.

2. Prices and Policy Data. The costs of each article, class of product, or operation being separately shown, the management has the necessary data at hand to guide it in making changes of policy or methods, these including:

(a) Establishing correct selling prices with the true costs as the basis.

(b) Eliminating the manufacture of any articles which show losses, and substituting for these more profitable articles.

(c) Increasing the efficiency of the salesmen by enabling them to concentrate their efforts and energies on the more profitable articles.

(d) Establishing correct rates of commission for salesmen upon the various classes of product.

3. Comparative Costs. Costs for different periods and under different conditions are obtainable, enabling the following comparisons to be made:

(a) A comparison of each article, job, or operation cost with standard, estimated, predetermined, or previous costs.

(b) A comparison of article, job, or operation cost under various methods of manufacturing, as for instance, bench work with machine work, day-work with piece-work, piece-work with premium or bonus work, etc.

(c) A comparison of article, job, or operation cost with outside prices under the various market conditions, thus ascertaining when parts or operations may be purchased or manufactured outside at a lower cost than the particular cost shown in the plant.

4. Detection of Inefficiencies. The records provide for following the material from the raw state until it becomes finished product, and for ascertaining the time, labor, and expense involved in its manufacture. In this way, the following inefficiencies may be detected:

(a) Losses of material
(b) Wasted time
(c) Defective work
(d) Poor supervision
(e) Various other "leaks"

5. Detailed Inventories. A cost system provides for keeping perpetual inventory records in detail of raw material, work in process, finished parts stock, and finished stock.

These records provide a means for discovering or determining:

(a) Losses of material.

(b) Obsolete stock.

(c) Insurance requirements for the merchandise in the various departments of the plant.

(d) Information for the purchasing department as to the quantities of materials on hand and the necessary requirements.

(e) The correct quantities of product which must be manufactured in order to maintain stock requirements.

(f) Information for the sales department as to deliveries on orders.

6. Standardization Data. A cost system supplies the information necessary for standardizing the work of a plant, which might include:

(a) Ascertaining the unit of production upon which the various departments of the plant may operate efficiently, thereby keeping the various operating departments balanced with each other.

(b) Changing day-work operations to piece-work operations, or perhaps to the premium or bonus system of paying wages.

(c) Establishing a basis for a planning or routing system of orders in the various departments.

These six advantages are not to be regarded as a brief for the value of cost systems, but rather as an analysis showing the lines along which a cost system influences the business organization.

Application of Cost Principles

The principles underlying cost-finding have all been analyzed and defined, but when it comes to the actual installation

of cost systems, the greatest skill and caution must be observed in applying these principles to the conditions that exist. No two manufacturing plants are alike, even in the same line of business. Every plant has peculiarities that bear upon the methods of cost-finding, and this makes each factory a problem in itself. It follows that in either writing or reading a treatise on the subject, this distinction must be clearly conceived. The knowledge of principles, without a corresponding familiarity with the facts and conditions of manufacturing, produces the theoretical cost-finder, who is frequently a nuisance. On the other hand, it is only the shallow thinker who trusts to a superficial study of forms and accounting practices, with the idea that such knowledge prepares him to go into any business and install a cost system. To attain success in cost work, one must understand the principles of cost accounting and be familiar with the conditions which actually exist, and must apply the principles so as to fit these conditions.

Uniform Methods of Cost-Finding

In almost every line of manufacturing industry trade associations have been formed, and during the last ten years great progress has been made through these trade associations along efficiency lines in buying, in manufacturing, and in extending trade. Furthermore, a valuable end has been served in promoting cordial and sympathetic relations among the various members of the associations. By means of these trade associations, the fact has been proved that while competition is beneficial, at the present time manufacturers can accomplish much more lasting results by assisting each other in their problems than by conducting a continuous trade warfare among themselves.

Out of the work of the trade associations has grown the idea of uniformity of cost-finding methods. In this connection, the expression "uniform cost system" has been used fre-

quently and has caused considerable misunderstanding on the part of manufacturers. A uniform cost system, even as applied to a particular line of industry, is impracticable if not impossible, and manufacturers are fully conversant with this fact. The proper phrase to use is "uniform methods of cost-finding." This means outlining the standard principles of cost accounting and, from these principles, arriving at uniform methods of treating costs as applied to a particular industry. An illustration of this matter may be given in connection with the manufacture of hosiery. Some plants buy their yarn, others manufacture it; some send out their goods to be dyed, others do their own dyeing; some manufacture cotton goods, others woolen goods. While a uniform system could not be applied, uniform methods may be established in the various plants according to their peculiar conditions.

The greatest advantage to be derived from uniform cost methods is that of insuring a more uniform selling price. This object would be attained, even if the uniform system were not as scientific as it should be; for if errors were made through the method established, all manufacturers would at least be figuring the same way, all would be making the same mistakes, and unfair and ignorant competition would be eliminated. No one questions the old adage that competition is the life of trade, but the majority of manufacturers know also that unfair competition is the curse of trade. No one should dread fair competition, for success will then depend on his own organization. If a manufacturer cannot make money in competition with other concerns when using the same methods of figuring costs, he can only conclude that his goods or his marketing, or both of them, are costing him too much. His next step, naturally, is to analyze closely the methods and conditions under which he is manufacturing and marketing his product, until he finds and corrects the inefficiencies which are handicapping him so seriously.

CHAPTER II

ELEMENTS OF COST

Manufacturing Costs

Material, labor, and expense are the three subdivisions of manufacturing costs which are known as the elements of costs. These elements may be grouped under the two following headings:

1. Direct charges
2. Indirect charges

Direct charges consist of those elements of costs which, entering into and forming part of a product, can be charged directly to the product. These direct charges, therefore, include:

1. Direct material
2. Direct labor
3. Direct expense

All elements of costs which are not chargeable directly to the product fall under the heading of indirect charges and include:

1. Indirect material
2. Indirect labor
3. Indirect expense

Direct Material

The cost of the substance or substances from which a product is made, is the direct material charge. In manufacturing industries, often the direct material charge includes several different kinds of material. For example, in a wood-

working plant, lumber, hinges, knobs, locks, paints, oils, and varnishes may all be used in the construction of the articles manufactured, and therefore, the direct material cost would include all these items. Direct material should be charged either to:

1. Some definite job, order, or article
2. Some definite manufacturing process

However, often an item by its very nature may be a direct material cost but, from a practical standpoint, cannot be charged directly to the product and therefore is included, as indirect material, among the indirect factory expenses. For example, nails and screws are often included among the indirect factory expenses in wood-working plants because it is impracticable to charge these items directly to the cost of a particular job, order, or article.

Also, in a straw hat factory, the materials that enter directly into the manufacture of the hat are braid or straw, the band, the sweat, the trimmings, and the thread. From a technical standpoint, this thread is just as much a direct material charge as the band or trimmings, but it would cost as much to find out the amount used in the manfacture of a dozen hats as the thread itself costs. It is, therefore, usually handled as an indirect factory expense item in the sewing department and is distributed and charged to the various hats on the basis of the number of hats produced. This is a good illustration of applying common-sense instead of theory, which is so necessary at times in cost-finding.

On the other hand, certain expense items are often included as a part of the direct material charge. For instance, when material is purchased in foreign markets, the amount of duty and import expenses should be added to the foreign cost of the material in order to ascertain the "landed cost" or direct material charge. Also, it is often found to be quite

feasible to add the incoming freight, express, and cartage cost directly to the invoice cost of material; the direct material charge then including the material cost plus cost of the incoming freight, express, and cartage.

Direct Labor

That portion of the factory wages which is productive in character and which may be applied directly to the product or to the manufacturing process, is the direct labor charge and is often termed the productive labor charge. Direct labor should be charged either to:

1. Some definite job, order, or article
2. Some definite manufacturing process

In manufacturing industries, the direct labor charge is generally subdivided into various different kinds of operations. For example, in a garment industry the direct labor charge would include the following operations:

1. Cutting
2. Trimming
3. Hand sewing
4. Machine sewing
5. Ribboning
6. Inspecting
7. Pressing
8. Boxing

Direct Expense

Any other expense which is applicable and which may be charged directly to a job, order, or article, is included as a direct expense charge. Such expenses are not infrequent, an example being the transportation and hotel expenses of foremen and workmen engaged on out-of-town special construction orders. Experimental work on special orders is often included in the costs under the caption "direct expense," although items

of this character are more frequently considered part of the factory indirect expenses and distributed over the entire product manufactured.

Indirect Charges

Indirect charges include indirect material, indirect labor, and indirect expenses. These indirect charges are often termed "factory overhead," "indirect factory expenses," "manufacturing expenses," "burden," or "oncost." Indirect charges as a class may be analyzed under the two following headings, depending upon the application and distribution of the items composing them and the methods of apportioning and distributing them to job, order, or article, or to the manufacturing process:

1. Departmental expenses, which include those expenses chargeable to definite departments of the factory because they are incurred in these definite departments.
2. General operating expenses, which include those expenses chargeable either over the entire plant or over more than one department of the plant.

The items composing the indirect charges will necessarily vary in almost every factory, but the following classified list includes certain items which invariably appear among the indirect charges of a plant:

1. Indirect Material:
   - Direct material which cannot be applied in a direct manner
   - Supplies
   - Scrap material
   - Small tools
2. Indirect Labor:
   - Indirect or non-productive labor

Supervision or foremanship
Superintendence
Inspection, when not considered as a direct labor charge
Factory clerks' salaries
Defective work
Experimental work, when not considered as a direct labor charge

3. Indirect Expenses:
   - Rent
   - Insurance—fire and liability
   - Taxes
   - Interest
   - Depreciation
   - Maintenance, repairs, and renewals
   - Power
   - Light
   - Heat
   - Freight and cartage inward, when not considered as a part of the direct material charge
   - Over, short, and damage
   - Miscellaneous factory expenses

Packing Expense

The cost of production, or the factory cost, ends when the article is finished and ready for sale. Therefore, the factory costs include the direct material, direct or productive labor, direct expense, if any, and the indirect charges. In some instances, a portion of the packing expense is included as part of the factory cost. When the finished articles are packed uniformly and stored in the finished stock warehouses, the packing department, in such an instance, may be included as a factory department and its costs considered part of the factory cost.

Selling Expenses

The items which are generally included among the selling expenses are the following:

- Advertising or advertising department expenses
- Sample expenses
- Commissions
- Salesmen's salaries
- Salesmen's expenses
- Traveling expenses
- Sales office expenses:
  - Rent
  - Clerks' salaries
  - Telephone and telegraph
  - Printing and stationery
  - Postage
  - Miscellaneous expenses
- Freight and cartage outward

Shipping department expenses and finished stock warehouse expenses may also form a part of the selling expenses. The selling expenses have no direct bearing upon the production or factory costs of the article, but provision must be made to cover them when determining the price for which the article will sell.

Administrative Expenses

The segregation of the administrative expenses as a distinct group is sometimes a difficult matter. In the majority of cases the time of the administrative force is spent in supervising the selling organizations, in solving factory problems of production and labor conditions, and in looking after the finances of the business. Therefore, administrative expenses often are partly production or factory costs and partly selling and administrative costs, and it is necessary to make an arbi-

trary distribution of them so that the factory and sales departments will be charged with proportionate amounts. In any event, before determining the selling price of the article, provision must be made for covering these administrative expenses.

The following items are generally included among the administrative expenses:

- Officers' salaries
- Executives' expenses
- Auditing expenses
- Legal expenses
- Administrative office expenses:
  - Salaries
  - Rent
  - Light and heat
  - Telephone and telegraph
  - Printing and Stationery
  - Postage
  - Office supplies
  - Miscellaneous expenses

Selling Price

Before determining the selling price of an article consideration must be given to the various elements of costs and expenses which have been classified as:

1. Direct material
2. Direct labor
3. Direct expenses
4. Indirect charges
5. Selling expenses
6. Administrative expenses

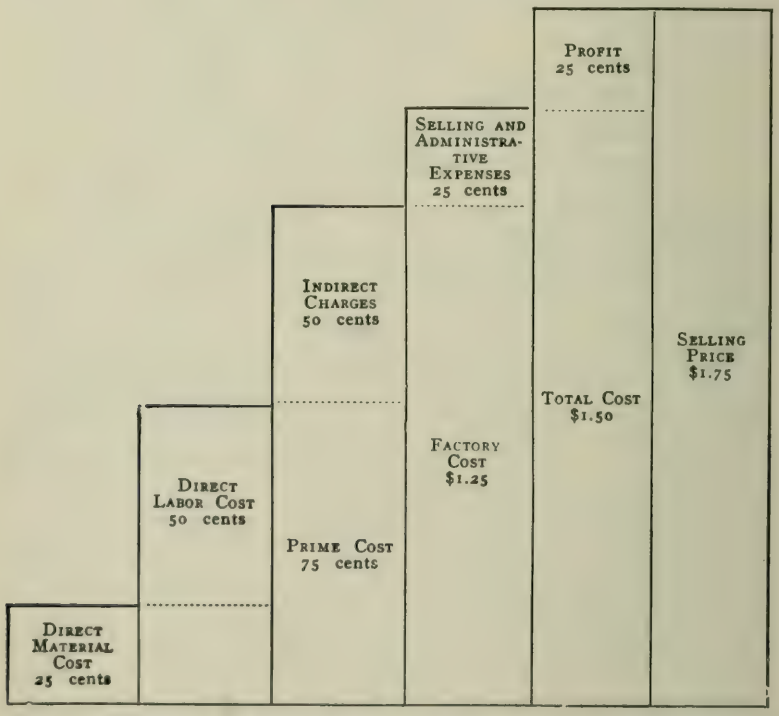
Prime Cost. The sum of the direct material cost plus the direct labor cost is known as the prime cost.

Factory Cost. The sum of the prime cost plus the indirect charges is known as the factory cost.

Total Cost. The sum of the factory cost plus the selling expenses and the administrative expenses is known as the total cost.

Selling Price. The sum of the total cost plus the profit is known as the selling price.

These gradations of cost may be further illustrated by means of the following simple diagram (Form 1), which illustrates the steps leading from the material cost to the selling price.



Form 1. Diagram Showing Relation of Cost Elements to Selling Price

Deductions

In practice it is customary to allow certain deductions from the established selling prices, or from the established purchasing prices. These deductions include:

1. Trade discounts
2. Allowances
3. Rebates
4. Cash discount

As a rule, the trade discounts are deducted directly upon the invoices rendered, and therefore do not enter into the account-keeping of the seller or purchaser.

Allowances to customers are treated as deductions from sales, though in some cases these items are included among selling expenses. Allowances received from creditors are generally considered as direct deductions from the invoice values and treated accordingly. It is quite customary to delay the passing of disputed invoices for account-keeping until all legitimate allowances have been deducted.

Special rebates allowed customers at the end of a definite period or after the expiration of a specified contract, may be treated usually as miscellaneous deductions from income. In some instances these items may be considered as deductions from sales. Similar rebates received by the purchaser may be treated either as miscellaneous income or as deductions from cost. However, it is often very impracticable to treat items of this character as deductions from cost because, in the operation of the cost system, it may be necessary to use the cost values shown upon original invoices—this because the amount of the rebates deductible cannot be definitely ascertained until the expiration of a particular period.

Cash discounts allowed and received are items which are treated in various ways in practice. In some instances, they form part of the capital expense and capital income, be-

- TOTAL COST
  - FACTORY COST
    - PRIME COST
      - 1. Direct Material
      - 2. Direct Labor
    - INDIRECT CHARGES
      - 1. Indirect Material
        - Material which cannot be applied in a direct manner
        - Supplies
        - Scrap Material
        - Small Tools and Dies
      - 2. Indirect Labor
        - Indirect or Non-Productive Labor
        - Supervision or Foremanship
        - Superintendence
        - Inspection (when not considered as a direct labor charge,
        - Factory Clerks' Salaries
        - Defective Work
        - Experimental Work
      - 3. Indirect Expenses
        - Rent
        - Insurance—Fire and Liability
        - Taxes
        - Interest
        - Depreciation
        - Maintenance, Repairs, and Renewals
        - Power
        - Light
        - Heat
        - Freight and Cartage Inward (when not considered as part of direct material charge)
        - Over, Short, and Damage
        - Miscellaneous Factory Expenses
  - SELLING EXPENSES
    - Advertising
    - Sample Expense
    - Commissions
    - Salesmen's Salaries
    - Salesmen's Expenses
    - Traveling Expenses
    - Sales Office Expenses
      - Rent
      - Clerks' Salaries
      - Telephone and Telegraph
      - Printing and Stationery
      - Postage
      - Miscellaneous Expenses
    - Freight and Cartage Outward
    - Shipping Department Expenses
    - Finished Stock Warehouse Expenses
  - ADMINISTRATIVE EXPENSES
    - Officers' Salaries
    - Office Salaries
    - Executives' Expenses
    - Auditing Expenses
    - Legal Expenses
    - Administrative Office Expenses
      - Salaries
      - Rent
      - Light and Heat
      - Telephone and Telegraph
      - Printing and Stationery
      - Postage
      - Office Supplies
      - Miscellaneous Expenses

TOTAL COST+PROFIT=SELLING PRICE

Form 2. Chart Showing Analysis of Cost Elements

ing included as deductions from, and additions to, income. In other instances, they are deducted from sales prices and the purchase prices. When fixing selling prices, these miscellaneous items should also be considered as well as the elements of cost and the selling and administrative expenses.

Analysis of Elements of Cost

Form 2 shows the items which should be considered in fixing a selling price.

CHAPTER III

GENERAL METHODS OF COST-FINDING

Requirements of Cost-Finding

As costs furnish the basis for determining the selling prices of the manufactured product, they naturally should be compiled so that the total cost of the job, order, or article may be readily ascertained.

Actual conditions in manufacturing determine the system of cost-finding to be used, which should include:

1. A method of ascertaining or reporting the material, labor, and overhead costs.
2. A method of compiling these elements of cost.
3. A method of determining the total cost of the job, order, or article.

For present purposes the actual conditions which exist in manufacturing industries may be grouped or summarized in two general classes, and the methods of cost-finding applicable to these two classes may be designated as follows:

1. Order method of cost-finding
2. Process method of cost-finding

Order Method of Cost-Finding

Distinctive Features of Order Method

When the order is the tangible basis upon which the elements of cost are charged, compiled, and determined, the order method of cost-finding is generally used. In other words, under such conditions the material costs, labor costs,

and a pro rata share of the factory overhead are all charged to definite factory orders, and the elements of material, labor, and overhead costs are compiled so that the total factory cost of each individual order may be determined. If a number of units are manufactured under the definite factory order, the unit article cost may be determined by dividing the total factory cost by the total quantity manufactured or produced. Definite factory orders may be issued for the manufacture of a number of units, for a single unit, or for the manufacture of certain parts of a unit.

The order method of cost-finding is often designated by other terms, such as:

Special-order method of cost-finding
Specific-order method of cost-finding
Job method of cost-finding

However, in all industries in which a definite job or order furnishes the basis for the compilation of the cost of the article, this method of cost-finding may be used, and in view of the fact that it includes the issuance of orders for the manufacture and production of standard articles, as well as for special articles, it is most accurately described by the term "order method of cost-finding." Examples of the applicability of the method to specific trades and industries are given below.

Construction Work

A good example of an industry in which the order method of cost-finding may be applied is the building trade. This includes building contractors of various kinds, such as general building, iron and steel, foundation, masonry and stone-work, carpenter, plastering, electrical, plumbing, and heating contractors, and various subcontractors.

In this class of industries each job, or order, is treated separately and the material, labor, and overhead costs are

ascertained for each job independently of the costs applicable to any other job. Therefore, the order method of cost-finding is suitable and may be applied very readily.

Repair Shops

In repair shops, which may include garages, wagon repairs, and machine shops doing repair work, the material, labor, and overhead costs are ascertained, compiled, and determined for each job separately, and the bill to the customer is prepared with this cost information as a basis; therefore the order method of cost-finding may be used.

Plating Shops

There exists, throughout the country, a considerable number of plating shops doing a so-called special-order business. In these, the material, labor, and overhead costs of each individual job are necessarily ascertained independently so that the proper charge may be made to each customer for his particular job or order. The order method of cost-finding may be here used satisfactorily.

Attention is called to the fact that this classification does not include the plating departments of large concerns which have their product standardized to such an extent that the plating operations become continuous for long periods of time. When these conditions exist, the order method of cost-finding cannot well be applied, and the process method must be used to ascertain accurate costs.

Cabinet Shops

Considerable special job work is done in various kinds of cabinet shops. These shops manufacture, or build, only on order; that is, they construct various kinds of furniture, fixtures, and equipment to meet the individual requirements of each customer. Each job, therefore, is handled as a separate

unit, bears no relation to any other piece of work in the shop, and the elements of cost for each must be determined separately.

Garment Manufacturing Plants

On account of the change in styles each season, the garment industries manufacture on more or less definite demand, and manufacturing is started with the issuance of orders for definite styles and quantities. As these definite orders furnish the basis upon which the costs are calculated, the order method of cost-finding is used most advantageously. Each order for the production of a definite quantity of a particular style of garment is charged with material, labor, and a proportion of the overhead cost; and the article or single garment cost is ascertained by dividing the total cost of the order by the number of garments produced. Garment manufacturing industries include the manufacture of cloaks and suits; coats, waists and dresses; underwear; gowns and evening dresses.

In some of the garment manufacturing industries, the product is standardized and the same articles are manufactured continuously day after day. Under such conditions, the individual order cannot be used as a cost-finding basis for the reason that it loses its identity during the regular daily routine of manufacture. It is then more feasible to use the process method of cost-finding to ascertain reliable and accurate article costs.

Straw and Felt Hat Plants

Straw and felt hat plants are also affected by changes in styles, and these changes in styles are reflected in the volume and kind or orders received. The definite order, then, furnishes the basis on which the article cost is compiled and ascertained.

However, in industries of this character certain depart-

ments may be so constituted that their costs are more readily ascertained by the process method of cost-finding. For example, certain treating processes may be used for all braids and felts of a particular kind regardless of the production orders, and in departments where such conditions exist the process method is used for ascertaining costs.

Boot and Shoe Plants

In these industries, again, the styles are a governing factor as to the quantity and kind of production which should be manufactured during a particular season. The order, therefore, furnishes the basis for reporting, compiling, and ascertaining the article costs in most of the boot and shoe plants.

Standardized articles and a large volume of production may change manufacturing conditions to such an extent that the process method of cost-finding can be used more advantageously. However, before the process method of cost-finding becomes the more practical method, the identity of the individual factory orders must be lost in the large volume of factory production which is continuous day after day.

Wood-working Plants

In wood-working plants, after the lumber is cut and machined, it is, as a rule, chargeable to some particular factory order. These factory orders may be for standard articles or they may be for special work to meet the requirements of certain customers. In the departments in which the material, labor, and overhead costs can be applied to definite factory orders, the order method of cost-finding may be used to advantage.

Metal-working Plants

In metal-working plants it is the practice to charge the cost of the castings to a factory order or to some definite job.

This is invariably the case where definite factory orders can be used as a basis for reporting and compiling the material, labor, and overhead costs. Under these circumstances the order method of cost-finding may be used to advantage either in those plants in which standard articles are produced, or in which special articles are made to meet customers' requirements. In metal-working plants producing large quantities of similar articles for stock the process method of cost-finding may be applied to the product.

Assembling Departments

The order method of cost-finding may be used advantageously in the assembling departments of various manufacturing plants. This is true even though, preparatory to assembling, the plant may manufacture numerous small parts the cost of which can only be compiled by the process method of cost-finding.

In the assembling department definite orders are usually issued for the production of fixed quantities of articles. These orders may be for a standard product or for a special product, and in either case the particular order or job may be taken as a basis for reporting and compiling the elements of cost.

Process Method of Cost-Finding

Distinctive Features of Process Method

Whenever the process of manufacture is continuous for regular periods of time so that the definite factory orders and jobs lose their identity and become part of a large volume of production, the material, labor, and overhead costs are chargeable to the definite processes or operations and the process method of cost-finding is used.

This method is sometimes called the "product method of

cost-finding." However, in view of the fact that the word "product" refers more particularly to article rather than operation, the designation "process method of cost-finding" is more explicit and is preferable. This term includes the method commonly known as the "machine-cost method," for the reason that the same general principles of cost-finding apply.

After the material, labor, and overhead costs and the total cost of the various processes or operations are ascertained, these should be summarized and redistributed so that the job, order, or article cost may be determined, usually on the basis of volume. The quantities which are used as the basis are the weight, the number of units, or the measurements of the various jobs, orders, or articles; in other words, tons, pounds, gross, dozens, yards, feet, etc.

Foundries

A common industry where the process method of cost-finding may be used to advantage is the foundry. This includes iron foundries, brass foundries, and various other metal foundries. In these, the melting operation is continuous for regular periods of time and no reference is made to the definite orders or jobs because their identity cannot be ascertained readily. In operation, the material, labor, and overhead costs are all charged to the cupola, and at the end of a definite period, when the total production is ascertained, the castings cost per pound can be determined.

Paper Mills

The material, labor, and overhead costs in the manufacture of paper are chargeable to the milling processes. The total quantity or the total number of pounds of paper manufactured at the end of a definite period is determined, and the cost of the paper per pound is then computed.

Paint and Varnish Manufacturing Plants

In small paint and varnish manufacturing plants, the material cost may be applied to the various batches definitely, as the identity of each batch can always be ascertained and the materials which are put into each are counted or weighed. Under these conditions the order method of cost-finding may be used.

However, if much red tape is involved in ascertaining the labor and overhead cost applicable to each particular batch, the labor cost and overhead cost of the various batches should, as a rule, be ascertained according to the process method of cost-finding.

Chemical Manufacturing Plants

In chemical manufacturing plants, continuous operations are carried on for regular periods of time and, as the material, labor, and overhead costs are applicable and chargeable to the processes, the unit or article cost can only be ascertained after the definite quantity of production is known.

In small chemical manufacturing plants, where the volume of production is not large and where definite small orders are manufactured specially for various customers, it may be possible to use the order method of cost-finding to advantage.

Rubber and Celluloid Manufacturing Plants

The manufacture of rubber and celluloid calls for conditions in which the process method of cost-finding can be employed advantageously. The identity of individual orders or jobs is entirely lost as the process of manufacturing is continued for regular periods of time. The materials which enter into the manufacturing processes are weighed and counted, and charged to the particular process. The labor and overhead costs are also charged to definite processes and, after the total production is obtained, the unit cost is found.

Manufacture of Foodstuffs

In plants where foodstuffs are manufactured and the process of manufacturing is continuous, the identity of definite orders cannot be readily ascertained without interfering with production. Therefore the process method is used, the material, labor, and overhead costs being charged to the various processes of manufacture.

Coal-Mining

Coal-mining affords a common example of the process method of cost-finding. The labor and overhead cost are charged to the definite operations, and, when the production or total quantity of coal mined is known, the unit cost per ton is determined.

Ice Manufacturing Plants

In the manufacture of ice, the process method of cost-finding is used, the material, labor, and overhead costs being charged to the manufacturing processes. When the total quantity of ice produced is known, the cost per ton of ice manufactured can be ascertained.

Treating Departments

All the product used in textile mills, metal plants, wood-working plants, and straw hat plants undergoes a special process or is treated in a certain way in particular departments. In such treating departments the process method of cost-finding is employed and the treating cost for each article is ascertained after the quantity treated is known.

Cutting and Machining Department—Wood-Working Plants

In wood-working industries where large quantities of standard product are manufactured, the costs of cutting and machining operations may be ascertained according to the proc-

General Methods of Cost-Finding Used for the purpose of: Ascertaining by reports the material, labor, and overhead costs. Compiling and summarizing these cost elements. Determining the total cost of the job, order, or article.	1. Order Method of Cost-Finding Also known as: Special-Order Method Specific-Order Method Job Method	Building Construction Industries Repair Shops (including garages and machine shops) Plating Shops Cabinet Shops Garment Manufacturing Plants Straw and Felt Hat Plants Boot and Shoe Plants Departments in Wood-Working Plants Departments in Metal Manufacturing Plants Assembling Departments
	2. Process Method of Cost-Finding Also known as: Product Method Machine Process Method	Foundries Paper Mills Paint and Varnish Manufacturing Plants Chemical Manufacturing Plants Rubber and Celluloid Manufacturing Plants Manufacturing of Foodstuffs Coal-Mining Ice Manufacturing Plants Treating Departments Cutting and Machining Departments —Wood-Working Plants

Form 3. Chart Showing Methods of Cost-Finding Applied to Various Industries

ess method of cost-finding. This may be done in cases where large quantities of lumber for the standard product are cut and machined in the same manner for regular periods of time.

The material, labor, and overhead costs are charged to the various cutting and machining operations, and, after the total quantities produced are ascertained, the unit article cost is determined.

Summary of Cost-Finding Methods

Form 3 shows in summarized form the two basic methods of cost-finding and the industries, or departments within a plant, to which they are applicable under the conditions already described.

CHAPTER IV

DEPARTMENTAL AND PRODUCT CLASSIFICATION

Factory Departments

Before it can be decided which method of cost-finding may be used in any particular plant, the manufacturing departments of the plant must be classified. In some industries the order method of cost-finding might be applicable to certain departments, and the process method of cost-finding might be applicable to the remaining departments. It is not an unusual condition to find both methods of cost-finding used in the operating departments of a plant. The classification of factory departments also plays a very important part in ascertaining costs, because the departments furnish the basis for the cost reports and also for the cost accounts.

The various elements of cost—material, labor, and overhead—are compiled and proved for each factory department, and the costs thus grouped can be proved with a greater degree of accuracy for each department than would otherwise be possible.

The operating departments of all factories cannot be classified in the same manner, though most factories are so organized that they may be divided into four main sections:

1. Raw material and supplies storerooms
2. Manufacturing departments
3. Finished parts storerooms
4. Finished stock storerooms

For cost purposes, a still more important classification is that based on the relation of the factory departments to the

output of the plant and on this basis they may be grouped and classified under the three following headings:

1. Productive departments
2. Non-productive departments
3. Miscellaneous departments

Productive Departments

The productive departments include those manufacturing departments that do the actual work upon the product. This would include work upon the different parts which will eventually be combined to form the completed article; it may include work upon items of material which will be returned to stores and later be requisitioned out as raw material; and it may include actual productive operations upon articles which will be stored in a semi-completed state to be made into the completed articles at a later date.

The productive labor element of cost is classified by operations as milling, graining, filling, etc., and each productive operation is known by some definite term. The sequence, relation, or uniformity of these productive labor operations usually furnishes the basis for establishing productive departments in the factory. The sphere of a productive department may be limited to a "center" from which the productive work is reported. For example, certain labor operations which are closely related as to the men and machines employed may be grouped to form a particular department, or "center" from which the work is reported after the final operation in that department has been completed. In other words, after a certain number of operations are completed, an inspection or a count of the articles manufactured is made, and the quantity produced is reported.

To sum up, productive departments are established after considering first the actual work done upon the product; secondly, the relation or uniformity of the productive labor

operations; and thirdly, the basis for reporting production. When dividing the factory into its departments the aim should be to split it up, so far as possible, into uniform and connected operations which represent distinct steps in the progress of the product through the factory.

Designation of Departmental Divisions

Productive departments, and the operations in these departments, should be given distinctive names and, if possible, be designated by distinctive symbols. The names and number of productive departments in a particular factory depend upon the nature of the work and the size of the plant, but the departmental classification may differ in factories turning out similar products. The following lists show fairly typical departmental divisions.

Furniture factory:

1. Cutting department
2. Machining department
3. Cabinet shop—special work
4. Cabinet shop—standard work
5. Paint and varnish department
6. Trimming department
7. Inspecting department

Metal-working plant:

1. Iron foundry
2. Brass foundry
3. Machining standard castings
4. Machining special castings
5. Plating department
6. Assembling department
7. Inspecting department

Garment factory:

1. Cutting department
2. Hand-sewing department

3. Machine-sewing department
4. Trimming department
5. Inspecting department
6. Pressing and boxing department

Non-Productive Departments

The non-productive departments of a factory are those in which the work done is only incidental to, or has an indirect relation to the product manufactured, as for instance the power plant or storerooms. These departments furnish centers about which the various elements of factory overhead arising therein or applicable thereto may be compiled. The total factory indirect expenses arising in, or applicable to, the non-productive departments is ascertained and is then redistributed to the productive departments, for the reason that all factory expenses must eventually be charged to the productive departments in order to reach the definite jobs, orders, articles, or processes to which they properly apply.

The non-productive departments are more or less the same in different industries, and the following list covers those usually found in a well-organized plant:

1. Power plant
2. Purchasing department
3. Receiving department
4. Storerooms
5. Engineering and drafting room
6. Cost department
7. Planning and routing department
8. Employment department

When inspection and experimental work involved in production cannot be charged to jobs, orders, or articles, the expense of such work may be departmentalized and treated as that of a non-productive department.

Miscellaneous Departments

In many manufacturing plants the work of some departments is partly productive and partly non-productive. A pattern or tool room, for example, may make patterns or tools chargeable to a specific job or order and make other patterns or tools chargeable to the factory overhead; or a mechanical department may construct machinery, fixtures, and equipment for sale or for the use of the factory itself—in which case their cost is to be capitalized among the fixed assets of the business; or such a department may also do work which is purely incidental to production, such as repairs and maintenance—the cost of these items forming part of the indirect or administrative expenses of the factory. In such cases, on account of the two-fold character of the departmental work, a separate classification must be provided and they are usually known as miscellaneous departments.

Miscellaneous departments usually include:

1. Mechanical, millwright, or repair department
2. Pattern department
3. Tool room

Under some conditions, these miscellaneous departments may be advantageously classified as productive departments. When this is the case these departments should receive credit for (1) all work done upon the product, (2) the cost of any construction work such as the manufacture of machinery, fixtures, and equipment for factory use, and (3) any repair and maintenance work chargeable to overhead. In most cases, however, the work of miscellaneous departments is largely non-productive, in which case it is absorbed in the factory overhead in the usual way.

General Operating Expenses

All items of overhead should be distributed to the departments which benefit from the expenditures, whenever this is

possible. In large plants, however, not all expenditures can be assigned in this way. Some of them, such as repairs to factory sidewalks, tramways, general yard work, general superintendents' salaries and expenses, production managers' salaries and expenses, and so on, are obviously incurred, not for the benefit of one or more departments, but for the plant as a whole.

Expenses of this character are considered as general operating expenses, and are treated in the same manner as costs which are applicable to the non-productive departments. To dispose of these expenses so that they will eventually be absorbed in the cost of the product manufactured, they may be charged in the article cost as a separate item of overhead, or provision may be made for distributing them over the various departments of the plant.

Summary of Departmental Classification

Form 4 shows the classification of various factory departments in summarized form.

Classification of the Product

One of the objects of operating a cost system is to determine the profits on the various classes of product manufactured. Year by year the variety of articles placed on the market increases and experts have gone so far as to say that many inefficiencies and losses are due to the fact that too wide a range in variety is offered to the public. In other words, the manufacturers of today are not standardizing their product as they should.

Under such circumstances as these, the cost of each article or product manufactured is vital information, as without it the manufacturer works in the dark. He cannot intelligently standardize production because, not knowing which are his most profitable lines, he does not know on which to concen-

FACTORY DEPARTMENTS Provide: For analysis of costs. Basis for arranging reports and accounts. Basis for proving elements of cost.	1. Productive Departments Work upon production.	Uniformity or Similarity of Operations Production Centers
	2. Non-Productive Departments Work incidental to production.	Power Plant Purchasing Department Receiving Department Storerooms Engineering and Drafting Rooms Cost Office Planning and Routing Department Employment Department
	3. Miscellaneous Departments Work partly productive but mainly incidental to production.	Mechanical or Millwright Department (Repair) Pattern Department Tool Room

Form 4. Classification Chart of Factory Departments

trate. Therefore, every cost system should provide for a comprehensive classification of the product, and costs should be ascertained on each class.

Some factories make only standard products, others work only on special orders, and others again combine both and also buy manufactured goods for resale. In the latter case the first step in the classification is to divide the articles sold as follows:

1. Standard articles manufactured for sale.
2. Special articles made to meet the requirements of customers.
3. Articles purchased for resale.

The three broad divisions enumerated above may be subdivided into as many classifications as there are lines of manufacture, or kinds of product sold.

One of the best sources of information for establishing this classification is the catalogue or advertising literature issued in connection with the sales of the product. The following classification is an example.

Varnish and paint industry:
- High-grade varnishes
- Medium-grade varnishes
- Wood-stains
- Fillers
- Japans
- Dry colors
- Mixed paints
- Enamel paints, etc.

In certain industries, it may be advantageous to have a very extensive product classification, the number depending, of course, upon the differences in the costs of a varied line. The above heading "mixed paints," for example, might be further subdivided into a dozen or more classes if the cost of

the various kinds of mixed paints varied sufficiently to make it worth while to calculate the cost of each separately.

The classification of the product also furnishes a basis for establishing storerooms for the different lines produced, such storerooms being controlled separately by distinctive cost accounts. These provide a means for checking the accuracy of the application of the elements of cost to the items of product stored.

Part II—Factory Routine and Detailed Reports

CHAPTER V

FACTORY ORDERS

Function of the Factory Order

After the product manufactured has been definitely classified, and distinctive factory departments established to provide centers for determining and reporting costs, some means must be found for applying the cost to the product as it passes through the operating departments. For this purpose, all items of product must be distinctively designated. This is usually done by means of order numbers, which not only facilitate the compiling of the elements of cost but also aid in tracing the jobs, orders, or articles through their different stages of manufacture. Work, whether upon orders or repairs, is generally put in operation by means of a proper authorization known as a "factory order." This carries a number by which the job, order, or article is thereafter known and distinguished from others.

Inadequacy of Verbal Orders

In small plants where the work is simple in character, instructions may be issued verbally. This practice is to be condemned regardless of whether or not a cost system is used, as many inefficiencies may be traced to orders of this character, the following being typical:

1. Loss of time due to delay of proper instructions in reaching the operating departments.

2. Loss of time in tracing the product in the operating departments of the plant.
3. Errors in workmanship due to the misunderstanding of instructions.
4. Irregular production due to the absence of the tangible instructions which are essential if factory work is to be given out in the proper order.
5. Indefinite and unreliable deliveries to customers due to the absence of a systematic record and method of tracing the various jobs, orders, or articles through the operating departments of the plant.
6. Absence of a definite record to serve as a basis for an accurate system of reports, whether it be a system of cost reports or a system of production or statistical reports.

Written Factory Orders

The efficiency of a plant can be judged only from the information furnished by a well-planned system of reports. Therefore, it is absolutely necessary that the authorizations to the factory to do any sort of work be made in writing so that these instructions may be kept in a permanent and accurate form and serve as a basis for reports and records.

Before deciding on the form and general style of factory orders, consideration should be given as to whether or not they give sufficient information so as to dispose of the objections to verbal orders. These objections summarized are loss of time, errors in workmanship, interference with production, improper deliveries to customers, and absence of permanent records. If the written factory orders dispose of these objections and insure the establishment of a permanent, accurate, and reliable system of reports, the benefits derived are apparent. In order to provide for these qualities of permanency, accuracy, and reliability, which are most essential

and which are not obtainable with verbal orders, the written orders must contain the following:

1. Date, order number, and description and authorization of the work to be done, thus permitting ready identification and furnishing a basis for applying and charging the elements of cost.
2. Complete instructions as to the method of doing the necessary work.
3. Required date of completion, so as to provide a means for ascertaining the order in which the different articles should be manufactured.
4. Provision for recording information as to the progress and completion of the order in each department of the plant, so as to provide a means for tracing orders and insuring prompt deliveries to customers.

It is evident that the above information covering working instructions can only be accurately transmitted in written form. A logical objection to the use of written factory orders sometimes advanced is that, if the mechanics in a small factory or a repair shop were always to wait for the issuance of written orders before beginning a fresh job, unnecessary delays would occur and time would be lost because of the red tape methods. In some cases verbal instructions may be given; but a written order should follow the verbal instructions so that workers cannot plead ignorance if mistakes are made and so that time and material may be charged to the order number to which they are to be applied.

Kinds of Factory Orders

Factory orders are of two kinds: those relating to production and those relating to miscellaneous factory work.

A production order authorizes the manufacture of certain

kinds of goods, or a single article which may be either for sale or for stock.

Miscellaneous factory orders are issued for the purpose of authorizing the construction or repair of factory buildings, machinery, tools, fixtures, or equipment. These orders are variously termed "Repair," "Betterment," "Maintenance," "Construction," "Shop," and "Plant" orders, the precise designation depending upon the character of the work to be done and the method in use in the plant.

Production Orders—Classification

Production orders may authorize the manufacture of either the completed product or parts thereof, and may be classified as follows:

1. As to special production:
   - (a) Orders for specially manufactured product.
   - (b) Orders for specially manufactured parts.
2. As to standard production:
   - (a) Orders for standard product.
   - (b) Orders for standard parts.
   - (c) Orders for part-finished product.
   - (d) Orders for manufactured parts.
3. As to repair production:
   - (a) Orders for repairs to the product for customers, or for repairs on product in the various stockrooms.
   - (b) Orders for disposition of defective work, or the correction of defects in finished stock, part-finished stock, or finished parts.

Designation of Quantities

In the order method of cost-finding the quantities to be manufactured and the disposition of the product are in most instances specified in the production orders. If the product

is a standard article kept in stock, it is advantageous to establish a definite quantity to be produced at any one time. Standardized units of production tend to increase shop efficiency by equalizing the demands for material and labor and insuring a steady flow of work through the factory. If the quantities of a standard product which is manufactured over and over again vary on each factory order, work tends to become spasmodic and its flow uneven with, in consequence, either congestion or slackness in the operating departments.

Under the process method it is not always practicable to specify definite quantities upon the production orders, for the reason that where this method is used the processes are usually continuous, lasting one or more days or even weeks. Orders are issued daily, weekly, or monthly, as required for the production of the articles designated thereon, and the quantity produced is usually determined after their manufacture and inspection is completed.

Sub-Production Orders

Where the product is composed of several parts manufactured separately, two kinds of production orders are issued:

1. The main or principal production order
2. Sub-production orders

The main production order designates the quantity and kind of completed articles, while the sub-production orders cover the manufacture of the various parts. The sub-production orders may be prepared and issued at the same time as the main production order, or they may be written up by the factory foremen or their clerks when it is necessary to manufacture the parts.

The Grouping of Small Orders

In factories where the units of production are small and numerous, the preparation of a separate order in each case

may involve so much clerical work as not to be worth the expenditure in time and trouble. If the system of cost-finding proves this to be a fact, the work can be simplified by grouping a number of small orders daily, weekly, or monthly and according to the classification of product. In this way one comprehensive order can be issued to cover the production of a score or more of small special orders. The advantages of thus grouping orders when the product is sufficiently homogeneous to permit it, are apparent. The number of records required is greatly reduced, with a corresponding reduction in the clerical work involved.

Special Production Orders

In some industries the entire line of merchandise is specially manufactured to customers' requirements. In such cases all the production orders issued to the manufacturing departments are for special production. These authorize the manufacture of the special product and the special parts, all of which are ready for shipment as soon as the work has been completed.

In other industries the product manufactured is more or less standardized and the special product forms only a portion of the total factory production. In cases of this kind it is essential so to designate the special production that it may be classified separately and not be confused with the regular staple line of merchandise.

The Production of Parts and Finished Stock

Production orders are issued for a standard product or for the manufacture of material or parts which will later form part thereof. This standard product includes those articles which form the staple line of the particular industry and which may be carried in stock for future sale. When the finished stock of certain standard articles is depleted, production orders

may be issued for standard product which is to be shipped to customers as soon as the manufacture of the articles is completed. Under such circumstances, the standard product does not go to the stock-rooms at all.

Standard production orders may authorize the manufacture of finished stock, finished parts, part-finished stock, or manufactured parts. The term "finished stock" designates the completed product stored ready to be shipped. Finished parts comprise those portions of the product which are stored to await their assembly into the completed article. Part-finished stock comprises all stock in an uncompleted stage of manufacture. Though "manufactured parts" has practically the same meaning as "finished parts," in some industries the parts to be used in the manufacture of the completed article are stored in the raw material storeroom where they are treated as raw material and requisitioned out when needed. To distinguish them from any finished parts kept in a parts stock-room, they are designated "manufactured parts."

To illustrate these various classes of production, the classifications used in the manufacture of desks may be cited. The completed desk is classed as finished stock; the sides, top, and drawers of the desk may all be completed separately and stored as finished parts; the assembled desk in the white, that is, before the varnish and finish has been applied, may be known as "part-finished stock." The locks and handles may be manufactured and transferred to the raw material storeroom and be designated as "manufactured parts."

"Finished stock" is also known as "manufactured stock" and "completed stock." "Finished parts" are also often termed "completed parts" and "manufactured parts." "Part-finished stock" is frequently designated "semi-finished stock," "partly finished stock," "partly completed stock," and "partly manufactured stock." The precise term used is immaterial if the meaning in all cases is clear.

Repairs to Product Orders

Production orders are sometimes issued to cover repairs to product, especially where the necessity for repairs occurs frequently. Such an order may relate to defective articles which are to be repaired and made salable. In all cases, production orders issued for the disposition of defective work, or for the correction of defects in articles manufactured, should be numbered and distinctively designated so that the costs may be properly applied. If the defective product cannot be repaired, the only practicable method of disposal may be to scrap it and sell it as such, or to reconvert it into raw material.

Miscellaneous Factory Orders—Classification

Miscellaneous factory orders include the following:

1. Construction orders, issued for the erection of new buildings, or the manufacture of machinery, tools, and equipment.
2. Betterment orders, issued to improve the buildings, machinery, tools, and equipment, or for experimental work which would tend to improve the processes of manufacture.
3. Repair and standing orders, issued to authorize the necessary repairs to the buildings, machinery, tools, or equipment.

These orders, like any other factory orders, are issued to collect the cost of the work they designate. The disposition or treatment of the cost is separately considered in following sections.

Construction Orders

As the cost of work done under construction orders adds to the capital investment in plant, it is capitalized among the

fixed assets. While it is apparent that no items of cost should be charged against a construction order which would unduly inflate the value of the asset produced, it is necessary to point out that this is frequently done through inexperience. Machinery constructed in a plant ill-adapted for the purpose has sometimes been capitalized at a much higher figure than that at which it could be purchased in the open market.

Betterment Orders

If betterment orders are issued for improvements which are permanent in their nature, such as the erection of partitions or the construction of a roadway, the costs should be capitalized among the fixed assets. If the betterment is an expense of a recurring nature, it should be charged to overhead, in which case, if large in amount, it may be treated as a deferred charge and its cost spread over several periods. The expense of painting the building is a case in point. Such a betterment obviously cannot be regarded as of any asset value, and yet it is not an expense wholly chargeable to the period in which the work is done.

Repair Orders

The cost of any repair work on buildings, machinery, tools, fixtures, and equipment should be compiled and charged to the department for which the expense is incurred, or to a general "Maintenance and Repairs" account if the expense is to be distributed over more than one department.

Certain kinds of repair work which recur with regular frequency, such as the repairing of belts, the sharpening of tools, the changing of dies, etc., may be covered by monthly repair orders. This makes unnecessary the issuing of a new repair order every time such work needs to be done, as all work of this character can then be charged to a "standing order" number to be described in the following section.

Standing Orders

Where the same kind of product is manufactured in similar quantity with more or less regular frequency, or where certain kinds of repair work form part of the ordinary routine of factory maintenance, a "Standing Order" may be issued to authorize the performance of that particular kind of work as required. Such an order may cover a definite period or "stand" until further notice. Workers then charge their time and any material used on a particular standing order against its number. This procedure does away with the necessity of issuing new orders to cover similar jobs again and again, while it standardizes and greatly simplifies the giving of instructions to employees.

To enable workers to charge their time and material correctly, the standing orders and their numbers are usually brought to the attention of factory employees by posting them on the department bulletin boards or by printing them on the back of time sheets—properly classified as to kinds of work for ready reference.

When a considerable number of standing orders are issued, an order register is a convenience, showing the fixed standing order numbers and the description of the work to be done under each of these orders.

Order Numbers

All factory orders should be numbered and classified by means of a definite series of numbers allotted to each class—as 1 to 5,000 for standard production orders, 6,000 to 8,000 for special production orders, 9,000 to 10,000 for other factory orders, and so on. The classification may also be designated by prefixing or affixing letters of the alphabet to the numbers. Employees then know at once the class of work involved when the key letter or number of the order is referred to.

Summary of Factory Orders

Form 5 summarizes the various kinds of factory orders which may be issued and the functions of these records.

Designing Factory Orders

The precise ruling of, and information furnished by, the factory order depends wholly upon the functions it is to perform. In actual practice it ranges from a simple notice to begin operations upon a certain class of work, to an elaborate record upon which may be compiled the various elements of cost affecting the particular order.

The design of the form may be determined by answers to the following questions. These will indicate the amount of information the record is to contain and thus the rulings and spaces to be provided.

1. By whom is the order to be issued and authorized?
2. How many copies are to be issued?
3. What is to be the disposition of each copy?
4. What are the requirements as to recording progress of work, defects, shipments, etc.?
5. What is to be the final disposition of all copies?

The answers to the above questions are covered in following sections.

Issuance and Authorization

In a large plant a special order department may be organized for the issuance of factory orders if the work is sufficient in its volume and detail to occupy the time of several employees. In some cases, however, the order work is taken care of in the factory superintendent's office. In small factories, the cost department, the shipping department, or the sales department may handle the work.

When special goods are manufactured for customers their

FACTORY ORDERS

For ascertaining and applying material, labor, and overhead costs to job, order, or article.

1. Main Orders.
2. Sub-Production Orders.

Procedure and Form:
- Issuance and authorization.
- Number of copies.
- Form and disposition of each copy.
- Recording of information as to progress, part shipment, defects, etc.
- Final disposition.

- **Production Orders**
  - 1. Special Production
    - Finished Product
    - Finished Parts
  - 2. Standard Production
    - Finished Product
    - Finished Parts
    - Part-Finished Product
    - Manufactured Parts for Raw Material Stock-rooms
  - 3. Miscellaneous Production
    - Repairs to Product
    - Defective Work
- **Miscellaneous Orders** (Construction, Repair, Plant, Shop, or Maintenance Orders)
  - 1. Construction Work
    - Buildings
    - Machinery
    - Equipment
  - 2. Betterment Work
    - Buildings
    - Machinery
    - Equipment
    - Process
  - 3. Repair Work
    - Buildings
    - Machinery
    - Equipment

Form 5. Classification Chart of Factory Orders

orders govern the issuance of factory instructions entirely. When standard products are turned out to a large extent, the maximum and minimum quantities on hand, as shown on the stock records, govern the kind and quantity of production. The miscellaneous orders issued to cover construction, repair, and betterment work, will obviously depend upon the requirements in each case.

Number of Copies

The number of copies of the factory order may range from one to eight or a dozen, depending upon the number of operating departments through which the order passes, and the final disposition of the product when it is completely manufactured.

As many copies of the factory order should be made out as there are persons requiring the instructions or information it contains. Where work is of a simple character two copies may suffice. One follows the job through the various processes of manufacture, and the other is kept in the office. If, however, the work passes through several departments and a number of foremen require special instructions, it would obviously be advantageous to issue a separate copy for each department. If the instructions go into great detail they should be entered on a standard practice sheet and a copy of the instructions should be attached to any order to which they apply. Blueprints, sketches, or drawings, should also be attached when required.

Simple Form of Factory Order

The simplest kind of a factory order which may be issued contains information as to:

1. Order number and date.
2. Department of the plant for which the special copy

of the order is intended, and date the order is to be completed.

3. Quantity of product and description of the work to be done.
4. Signature of the person responsible for the issuance of the order.

The simple production order shown in Form 6 gives all the above information.

FACTORY ORDER

No.....

Date.....

To.....DEPARTMENT

Manufacture the following articles and have same completed.....

QUANTITY	DESCRIPTION

Approved by

.....

.....

Signature.

Form 6. Simple Factory Order. (Size, 8 x 5.)

Development of Factory Order

Further stages in the development of the order are when, in addition to describing the work, it also designates:

1. The material to be used.
2. The patterns, tools, or dies required.
3. The time the work begins and ends.
4. The production, classified as to good and defective.
5. The date of shipment.
6. The cost of the order.

Thus such a record may be developed to serve any or all of the following purposes:

1. Factory order and instructions to foremen
2. Factory order and material requisition
3. Factory order and labor report
4. Factory order and production report
5. Factory order and shipping record
6. Factory order and cost sheet

When the factory order is combined with the material requisition, a copy should go to the stock clerk, so that he may be notified of the material requirements of the particular job. This enables him to check the quantity issued, which cannot be exceeded except upon the request of a responsible official. A supplementary material requisition should then state the reason for the additional withdrawal. Factory orders of this kind guard against dishonesty and serve as a check for reporting spoiled or defective work, which otherwise might pass unnoticed. Whether or not the factory order is used as a material requisition, or a separate requisition is made out from the information given on the order, is a matter of convenience in a given case.

When the factory order and labor report are combined, this form should provide for gathering information as to the quantity produced, the time spent in producing it, and the men employed, after which it is returned to the cost office so that the labor cost of the order may be compiled.

When the quantity produced is reported upon the factory

order, it becomes a production report. When it is desirable for the factory order to serve this purpose, it may be printed and prepared in the form of perforated coupons—one for each department from which a report of production is required. The receipt of these coupons in the office then indicates the progress of work and the completion of the job in the department which has sent in its coupon.

When the duplicate copy of the factory order takes the form of a shipping order, it should contain all necessary shipping instructions and space for recording shipments, either in part or in whole. When the duplicate copy serves as a cost sheet, it should provide columns for collecting the material, labor, and overhead cost of the job.

Filing and Final Disposition of the Factory Order

The filing and final disposition of the various copies of the factory orders depend to a large extent upon the use in each case. Upon each copy should be printed the exact purpose for which it is to be used, and also to whom it is to be sent. One copy should remain, of course, in the department in which the order originated. If it is not possible to issue the orders from a department, an order register should be kept showing the numbers of those issued, with a description of the work to which they relate; or a copy of all orders issued may be filed to give the required information.

If a copy of the order is used as a material requisition, this copy should be returned to the cost office after the information as to the quantity and description of material issued has been entered and approved by the stock-keeper. In the cost office, it would be filed in a separate material requisition file, according to order number or requisition number, if one were used, after the information as to material cost has been properly posted on the cost records.

When a copy of the factory order is used as a labor re-

port, this copy is returned to the pay-roll department and cost office, after the information as to the labor cost has been properly entered thereon. When the pay-roll department and cost office have finished transferring the information to the pay-roll records and cost sheets, the labor reports may be filed according to department and order number, or according to department and operator's number.

Copies of the factory orders used as production reports should be returned to the cost office after the information as to production has been properly recorded in the factory. These production reports should be filed according either to operating department and date, or to factory order number after the information has been transferred to the summarizing records.

The shipping record copy of the factory order—when this is used—often remains in the shipping department where, after the entire order is shipped, it is filed in a separate loose-leaf "Completed Orders Binder" according to factory order or shipping order number. If the shipping record copy of the factory order is returned to the office after the order is entirely shipped—for the purpose of preparing the customer's invoice—such copies may be filed according to factory order number in a loose-leaf binder in the office.

When a copy of the factory order is employed as a cost sheet, such copies are filed in loose-leaf binders, according to order numbers so as to facilitate the daily postings of the material, labor, and overhead items to cost sheets. After the orders are entirely completed and the total costs are ascertained, the cost sheets are filed according to the factory order number, customer's name, or articles manufactured—as the case requires.

Sales Orders

When the product is specially manufactured, the customers' instructions form the basis for the issuance of the pro-

duction orders the data for which are usually obtained from the sales orders.

Orders from customers may come in from several sources and in many forms, but most organizations provide a stand-

SALES ORDER

No.....

Date.....

Customer's Name.....

Address.....

.....

Terms.....

Shipping Instructions.....

.....

Article	Grade	Quantity	Price		Amount	

Approved by ..... Taken by .....

Form 7. Sales Order. (Size, 6 x 11.)

ardized sales order blank similar to that of Form 7. On this is recorded the customer's name and address, together with shipping directions and terms for the payment of the merchandise,

also sales order number and date. Columns below provide for recording the article or style number, the quantity ordered, the grade or size, and other descriptive information.

Before the sales orders are passed to the order department for registry or to the shipping department for shipment of the merchandise, they should be approved by the credit department; and no sales order should be accepted without such approval, as the terms proposed and the customer's financial status may not be satisfactory.

If the product is to be specially manufactured, a separate factory order is issued for each sales order received. When the product is standard, it may be possible to group several jobs and issue one factory order to cover the requirements of a number of sales orders. On the other hand, sales orders are often filled from stock on hand, the factory orders being issued for fixed quantities of production for stock at various times during the season of manufacture.

When the process method of cost-finding is used, the sales orders received from the customers have only an indirect relation to the factory orders. The processes of manufacturing are continuous and practically all sales orders are filled from the stock of finished articles on hand.

Registering Sales Orders

Sales orders should be registered as received so that information as to the quantity of production ahead of the factory may be readily available at all times. To this end it is advisable to make duplicate copies of the sales order, one to serve as a register of the order and another for use in preparing the factory orders. A copy of the sales order is also a convenient record of the number of "back orders" on hand when part shipments are made on orders of unwieldy size or to hasten delivery to impatient customers. In addition, orders received should be registered by kinds of articles or product in demand to show all of the unfilled sales orders for that

particular article. When numerous orders are received for delivery at future dates, it is advisable to keep a register of sales orders, in which appears each customer's account. To sum up the method of insuring that orders are delivered on the date promised it is necessary:

1. To keep sales orders numerically arranged so that quick reference may be made to items ordered and items which have been shipped.
2. To register sales orders according to customers' names to show the unfilled order numbers and the quantities due on each order.
3. To register sales orders according to articles to show the quantity of each kind ordered.

Customers often inquire as to the state of their unfilled orders, and this information is gathered from the record which shows the quantities due each customer on each sales order.

After an order is completely filled and all the customer's requirements have been satisfied, the various copies of the sales order are transferred to files which may be arranged according to order number, customer's name, or article manufactured. Full indexes should always be maintained, thereby enabling quick reference to be made to any sales order, whether specified by order number, customer's name, or article.

CHAPTER VI

MATERIAL AND MATERIAL REPORTS

Procedure in Handling Material

The first element of cost to be considered in cost calculations, or when ascertaining the selling price of product, is the material cost. The securing and handling of material as it comes in and passes through the processes of manufacture in the different departments of the plant involves:

1. Purchasing
2. Receiving
3. Storing
4. Requisitioning
5. Disposition
6. Ascertaining cost
7. Inventorying

Purchasing the Material

The routine of purchasing material is mainly concerned with the methods by which the different departments of the plant make their material needs known, and the methods of ordering the material from outsiders. In large organizations the purchase of material is always made by or under the direct supervision of a well-planned purchasing department. The forms generally used in the purchasing department are the following:

1. Purchase requisition
2. Purchase order
3. Register of purchase orders
4. Price records

Purchase Requisition

The purchase requisition (Form 8) is a request for purchases, upon which are entered the requirements for materia and supplies for the various departments of the organization. A purchase requisition may be prepared by:

1. Raw material stores clerk
2. Factory superintendent
3. Foremen of operating departments
4. Heads of office departments

PURCHASE REQUISITION

.....DEPARTMENT

No.....

Date.....

To.....
(Purchasing Agent)

Please place an order for the following articles:

QUANTITY	DESCRIPTION

Date Wanted.....
Purchase Order No.....
Date of Purchase Order.....

Signed.....
Approved.....

Form 8. Purchase Requisition. (Size, 8 x 5.)

Every purchase requisition should bear a number, should be properly dated, and should show the department in which it originated. It should contain a complete description of the material desired, and the quantity, and may provide a space for recording the purchase order number at the time an order is placed for the material. When the material is needed in a hurry, a "rush" purchase requisition may be prepared of a different color from the regular purchase requisition. If this is not thought advisable, the requisition should be indicated in some other way as a "rush" requirement, so that the order for the material will be placed promptly. Purchase requisitions should be signed by the person requiring the material and be approved by some person in authority, if the person preparing them is working in a subordinate capacity.

As a rule, the purchase requisition is prepared in duplicate. The original is sent to the purchasing department where it is filed after the purchase order has been properly prepared; the duplicate copy remains in the department in which the requisition originated.

The stores clerk usually prepares purchase requisitions for replenishing the stock, in accordance with the maximum and minimum quantities of raw stock and supplies to be carried, as indicated upon the raw stock records. The minimum quantities show the limit below which it is not safe to allow stock to go, on account of the risk of exhaustion before a new supply can be secured, with a possible serious delay in filling customers' orders. The maximum quantities are the standard amounts above which it is undesirable to go for the reason that too much capital may be invested in a particular item, or the "over-stock" may deteriorate before it can be used. When these maximum and minimum quantities of stock to be carried are once definitely established, they are, as a rule, entered upon the storeroom records so that the stores clerk may have this information always at hand.

When the process method of cost-finding is in use, and the product is a standard article or line, the stores clerk prepares practically all of the purchase requisitions. When the order method of cost-finding is in use and the articles manufactured are special in character, the requisitions may be made out by either the factory superintendent, the production manager, or the foremen of the operating departments in which the materials are needed, as these foremen know better than almost anyone else the material requirements of the special work on hand. In some organizations the material requirements for special articles are determined by a well-organized material department. In other organizations purchase requisitions of this nature are prepared by office clerks who, from a study of the requirements as shown by the blue-print, sketch, drawing, model, or estimate, determine the materials needed.

Purchase Order

The purchase order (Form 9) is an order form upon which are entered definite instructions to the seller as to material and supplies desired. Usually the purchase order is made out in duplicate, the original copy going to the selling firm and the duplicate remaining in the purchasing department where, until the order is filled, it is kept in an unfilled orders file. All purchase orders should be given a serial number and this number should be entered upon the invoice by the selling concern. This simplifies reference to the purchase order should any question or dispute arise before the material is finally accepted and used.

The purchase order form should provide for the date, and the name of the concern from whom the material is ordered. Provision should also be made for a complete statement as to the quantity and kind of material desired. Instructions as to the shipment of the articles ordered are often incorporated in this form. In most cases the prices of articles or-

dered are also shown, together with the terms of payment. The form should be signed by the head of the purchasing department.

PURCHASE ORDER

A. B. C. COMPANY

Philadelphia, Pa.

No.....

Date.....

To.....

Address.....

You are hereby authorized to furnish the following material on ..... to be shipped to..... ..... via.....

QUANTITY	DESCRIPTION	PRICE	TERMS

Kindly acknowledge receipt of this order, and place above order number on all packages and invoices.

.....
(Signature)

Form 9. Purchase Order. (Size, 8 x 5.)

When contracts are placed for the purchase of material and part shipments are received over long periods of time, provision should be made for recording, upon the back of the

purchase order, part deliveries of the material. Purchase orders should also provide for recording the date of approval of the invoice, which denotes that the purchase order has been properly filled and completed. After this—the material having been received and the invoice passed for entry and payment—the copy of the purchase order in the office is transferred to a "filled orders" file.

It is often desirable to combine the purchase requisition and purchase order, thereby eliminating the necessity of having two forms. This is especially true in small concerns, and in such case, three copies of the form would be prepared. The original copy goes to the selling company and serves as a purchase order; the duplicate copy remains in the purchasing department as the reference copy of the purchase order; and the triplicate copy remains in the department in which the order originated, in this case serving as a purchase requisition.

Register of Purchase Orders

Every purchase order should, of course, be given a serial number so that it can be filed numerically after it is filled, for future reference. On the other hand, it is often necessary to file unfilled purchase orders alphabetically under names of the concerns to whom the purchase orders were sent. From this file information can be obtained at any time as to the exact date and number of every purchase order which has been sent to any particular concern.

If these orders are arranged and filed alphabetically, according to the names of the concerns to whom they were sent, it may be desirable to prepare also a register of purchase orders (Form 10), showing the date, the number, and the name of the selling concern in a columnar-ruled record so as to facilitate reference to individual orders when checking the invoices, and receipt of material, etc.

REGISTER OF PURCHASE ORDERS

For the month of....., 19.....

Day	Purchase Order No.	Name of Concern

Form 10. Register of Purchase Orders. (Size, 8 x 11.)

Filing of Catalogues, etc.

The purchasing departments of large concerns receive numerous catalogues, price lists, and price quotations in connection with the material and supplies which are ordinarily purchased by them. The filing and method of using these quotations, price lists, and catalogues is an office organization matter, and as a rule has little direct connection with the cost organization. All catalogues should be numbered and should be indexed by names and by articles, so as to facilitate reference to them.

The price quotations on materials and supplies, which fluctuate considerably, should also be registered upon a permanent record so as to facilitate reference to the prices which were quoted at different times. This price record is of value, as well, for checking the prices upon the purchase orders and invoices and in discovering discrepancies.

Price records may be kept upon a standard 3 x 5 index card, these cards being headed with the name of the concern which has made the quotation and price. The date of the price, and the description or kind of material, should also be specified upon these cards. The cards are usually arranged alphabetically under the name of the concern, but in some instances it may be advisable to arrange them alphabetically, according to the article or the class of merchandise which is quoted.

Receiving the Material

In receiving material and supplies, the following records are usually employed:

1. Receiving record
2. Report of material received
3. Invoices from creditors

Receiving Record

It may be necessary in some industries to keep a separate receiving record of all packages, boxes, barrels, cases, and casks of goods received. This record should show the date the material is received, the concern from whom it is received, and the number of packages, boxes, barrels, etc., received. The record should be made by the person receiving the material. A record of this kind is kept when it is impossible to inspect, count, and check promptly all the material received, and it is very simple in design. Form 11 will answer the purpose in many cases.

Sometimes the receiving record takes the form of a receipt book, each receipt of material being recorded in this book upon a separate page. In most instances, it is used for tracing items the receipt of which is questioned. It is of little value for checking invoices received from the selling concerns as

it does not go into sufficient detail. For this purpose, it is necessary to use a more specialized form of material received record.

RECEIVING RECORD

No.....

Date.....

Received from.....

Address.....

Number and Kind of Packages	Description
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

.....
Signed

Form 11. Receiving Record. (Size, 6 x 4.)

When goods are not opened for count and inspection as soon as they are received, it is often necessary to accept the invoice temporarily as a record, checking the number of packages as shown by the invoices with the receiving record just mentioned. It may then be necessary at a later date to make a claim for "over, short, and damage," which is discovered when the merchandise and supplies are actually opened, inspected, and counted.

Report of Material Received

When a thorough inspection is made of material received, the results are often reported upon an especially designed report of material received, this report being prepared by the person making the count and inspection. The advantages of using a material received report instead of checking the material directly with the invoices received from the selling concern, is that it insures an actual count and inspection of the merchandise and supplies by the receiving clerk, which is not always the case when the invoice is used.

A report of material received should provide for a record of the date the material is received, the name of the concern from which it is received, the quantity and complete description of the material. Provision may also be made for recording the purchase order number as well as information as to the cost of material and cost of handling, including freight, express, and cartage costs. If the material is specially ordered for immediate use upon a particular factory order, columns may be provided on the material received report for recording the distribution and charging of the various items of material cost. The material received report should, of course, be signed by the person preparing it, and it may require the approval of some person in authority, who then also signs the report. This approval is necessary when the detailed reports are prepared by some clerk acting in a subordinate capacity. Form 12 is a simple form of the report of material received.

The purchase requisition, purchase order, and report of material received should act as a complete check upon every phase of a purchase.

It is often advantageous to use a copy of the purchase order as a material received report. If this can be done, it eliminates the necessity of a special record for the material and supplies received. Any additional copies of the purchase order

needed, containing details as to the description of the material, the name of the concern, the date, the purchase order number, etc., are prepared by means of carbon paper at the same time the original copy of the purchase order is prepared. The quantity of material ordered is often not shown upon the copy

REPORT OF MATERIAL RECEIVED

No.....

Received from.....

Address.. .....

Purchase Order No.....

QUANTITY	DESCRIPTION OF MATERIAL
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

Date Received..... Date of Invoice.....

Received by..... Date of Invoice.....

Date Inspected..... Entered on Summary.....

Inspected by..... Entered on Stock Records.....

Form 12. Report of Material Received. (Size, 8 x 5.)

which is to serve the purpose of a report of material received. This copy goes to the receiving clerk or to the person who inspects and counts the merchandise and who, when it is received and the count and inspection are made, enters the quantity actually received upon the report. The receiving clerk

is thus compelled to count or measure the material. When the merchandise has been received, counted, and inspected, the copy of the purchase order which acts as a material received report is returned to the office for the purpose of checking it with the invoice from the selling concern.

All material received reports should be sent to the office, where they can be checked with the invoices which are received from the creditors. It may be necessary to keep a copy of the report of material received at the place where the form originated and often it is advisable to have a copy of the form prepared for the use of the cost clerk or stock-keeper so that the proper entries can be made upon the cost summaries and cost records.

Invoices from Creditors

Invoices received from creditors should be passed for entry upon the general and cost summarizing records. However, before these invoices are approved, they should be checked with the purchasing and receiving records. The material purchased should be checked as to the kind, quality, and quantity required, ordered, and received. The price as shown upon the invoice should also be checked with the price as shown upon the purchase order or as shown by the office price records. After the quantity, description, and price have been checked, the mathematical calculations should be verified.

In order that all invoices may be properly checked before they are passed for entry and payment, it may be advisable to stamp each invoice as it is received with a blank form providing space for recording upon the invoice the date or dates on which it was checked, and the names of the persons who have checked the various features of the invoice. This stamp may be designed differently to meet each individual requirement. Form 13 shows a simple design which may be used advantageously in many cases.

Purchase Order No.....

Receiving Report No.....

Quantity O. K.....

Price O. K.....

Extensions O. K.....

Charge Account No..... $.....

Charge Account No..... $.....

Charge Account No..... $.....

Purchase Record Entry.....

Stock Record Entry.....

Approved.....

Form 13. Invoice Stamp. (Size, 3 x 3.)

Storing Material

In storing material, two classes of stock records are usually employed:

1. Bin records
2. Stores ledger records

Both of these record information of a similar character, but the bin records are often limited to quantities only, whereas the stores ledger records contain more complete information, dealing with prices and costs as well as quantities.

Bin Records

Raw material and supplies are arranged in the storerooms in closets, racks, or bins. It is essential that the bin record be tacked in a convenient place where the material is stored. This bin record should provide for information as to the receipt and issuance of the material. Columns may be provided for showing the dates and the quantities of receipts and with-

drawals and the quantities on hand. These entries should be made upon the bin record daily at such times as material is put into, or taken out of, the storerooms, and are usually made by the persons who handle the material. Bin records should always be of the simplest character and be used for checking the more complete transactions shown by the regular stores ledger records. A simple bin record is shown in Form 14.

BIN RECORD

No.....

Article..... Units.....

Date	Quantity Received	Quantity Issued	Quantity On Hand	Date	Quantity Received	Quantity Issued	Quantity On Hand

Form 14. Bin Record. (Size, 6 x 8.)

Record of Raw Material

The record of raw material (Form 15) is one of the most important of the factory documents. This record is also known by the terms "Stock Record," "Stores Ledger Record," "Storeroom Record," etc. It bears the same relation to the stock that the cash book bears to money, and therefore should be kept with equal care. Stock represents money and is

STOCK RECORD

Article..... Location..... Classification No.....

Grade or Style..... Unit of Measure..... Maximum..... Minimum.....

Received				Delivered and Balance							
Date	P. O. No.	Price	Quantity	Date	Req. No.	Quantity	Balance	Date	Req. No.	Quantity	Balance

Form 15. Record of Raw Material. (Size, 8 x 5.)

only another form of it. As the cash book shows the receipts and disbursements of the money and the balance on hand, the stock record shows the material received, material used, and the balance which should be in the storeroom.

The effectiveness of the stock record depends very largely upon actual storeroom accommodations and upon the precautions taken to prevent any but properly authorized persons from removing the material from its designated place. If access to the storeroom is permitted to everyone, material is likely to be taken to fill orders without the authority of a material requisition. Also, if access to the stock is easily obtained, the men will often replace material damaged in process without making a record of the material withdrawn. Such a leak is serious and must be guarded against carefully, for, if it exists, it both falsifies the costs and causes considerable trouble in the cost department.

The storeroom should be centrally placed, unless a separate storeroom is conducted for each department. The racks, bins, etc., should be arranged with reference to the materials, so that the whole will be orderly and not look like a junk room. Disorder in appearance tends to create disorder in handling. Bin records and finding lists, showing the location of the stock, may be necessary when the stores are complex and contain a great variety of articles more or less similar. Special storerooms or yard places should be reserved for heavy and cumbersome materials close to the place where these materials will be needed.

To record the location of material and to save time and space, a system of reference numbers and letters should be devised. Thus if B is the symbol for "bolts," B-4-C-17 might mean a 4-inch bolt in division C, section 17, of the storeroom. These symbols may be used throughout the system of records and accounts and result in a great saving of time and trouble.

A systematically conducted stock record performs other

valuable functions besides showing leaks. One of the most important of these is to provide the data for the "perpetual" or "going" inventory. The troubles of inventorying are well known; it usually takes a long time, causes much work, and sometimes necessitates the temporary closing of the plant. Even then the accuracy of the inventory is questionable, yet its information is essential in the preparation of any reliable statement of financial standing and earnings. With a well-kept stock record these usual inventory troubles are avoided, as a complete inventory is at hand at any time, showing both the amounts and the values of materials in the storeroom. To do all this, the record must be designed with columns for material ordered, received, requisitioned out, and balance on hand.

Besides these columns for inventory information, extra columns may be added to distinguish between material reserved for orders already received and the balance available for new orders. This distinction, together with the record of the maximum and minimum amounts, and a column showing material ordered but not yet received, gives all the information necessary for keeping the stock supplies up to working requirements in every respect.

When the same article is carried in stock in numerous sizes, colors, or styles, it is sometimes advisable, for easy reference, to use one sheet for the article as a class, and group the different varieties separately. Active stock will require separate sheets for each article; but where purchases are infrequent and the stock is drawn out in large quantities, one sheet may be sufficient for several articles, blank lines being left on the sheet between the different articles.

The stock record should be verified from time to time by actual weight, count, or measurement, so that any discrepancy or leak may be discovered. It is a good policy to verify a certain number of articles each day or week, without letting it be known in advance what articles are to be inventoried.

Stock records may be designed to give information only as to the quantities of material and supplies, or they may give the values as well as the quantities of the material on hand.

As it is quite usual to have several storerooms in one industry, it is often advantageous to have a separate set of stock records for each storeroom. Some industries are so organized that storeroom records are kept for the main storerooms and an entirely separate set of records for the sub-storerooms.

Whether or not it is advisable to keep one set of stock records or several distinct sets of stock records depends, to a large extent, upon the physical lay-out of the plant. As cost accounting deals largely with the analysis and control of separate detailed items of cost, it is always advantageous to plan all records which deal with factory operations so that discrepancies may be localized and responsibility placed upon definite persons in the organization.

Issuance of Material

The issuance of material from the storerooms usually involves the following forms and records:

1. Material requisitions
2. Bills of material
3. Credits for material returned

Material Requisitions

A material requisition (Form 16) is an order upon the storeroom for a certain quantity of material and supplies needed for a particular purpose. Material requisitions may be used as requisitions for supplies chargeable to an expense account, or for materials for certain definite jobs, orders, or articles. Such requisitions are prepared by the foremen of the operating departments and by the heads of the other departments of the organization. They are formal orders upon the storerooms, approving and authorizing the issuance of the

MATERIAL REQUISITION

No.....

Date.....

STOREKEEPER:

Deliver the following articles to.....Department

For Order No..... For Process No.....

QUANTITY	DESCRIPTION	FOR OFFICE USE				✓
		Price		Amount		

Charge Account.....	Entered on Summary.....	Signed.....
Credit Account.....		
Posted to Cost Record.....	Entered on Stock Record.....	Approved.....

Form 16. Material Requisition. (Size, 8 x 5)

material for which they call. They should contain detailed descriptions of the materials desired, together with quantities.

Often a requisition is issued for material which is transferred from one stock-room to a sub-stock-room or to a particular operating department. When the order method of cost-finding is in use, material requisitions are usually so designed that the quantities and descriptions of the material called for may be checked up with the requirements of the definite factory orders. The stock clerk should check the quantity and description of the material before honoring a requisition.

Each requisition should be dated and numbered, and also should be signed by the person receiving the material and should bear the approval of some person in authority. A column should be provided for recording the cost. Form 16 shows a simple material requisition.

Under simple conditions of manufacture it is often possible to combine material requisition with the factory order. In small organizations where all product manufactured is very similar in character, the combination of these forms is often met with. In large manufacturing industries, where the different kinds of articles manufactured are numerous and the work done is special and standard, such a combination cannot be made profitably. Under such conditions, it is not unusual to see five or six different kinds of material requisitions, all being used practically in the same manner, but each containing information of a particular character.

Material requisitions are also known by various other names, as "Stores Orders," "Material Reports," and "Requisitions for Supplies."

Bill of Material

A bill of material (Form 17) is a technical term which designates a standardized-material requisition. It is used when

BILL OF MATERIAL

.....DEPARTMENT

No.....

COST DEPARTMENT:

The following articles have been taken from Raw Stock for the production of the articles mentioned:

Articles Produced..... Order No.....

Quantity.....

QUANTITY	CLASSIFICATION NO.	DESCRIPTION	✓	FOR OFFICE USE	
				Price	Amount

Charge Account..... Entered on Cost Record.....

Credit Account..... Entered on Summary.....

Entered on Stock Record.....

Form 17. Bill of Material. (Size, 5 x 8.)

the materials to be issued have been standardized both as to quantity and kind. Therefore, it takes the place of material requisitions in factories where the product manufactured is standardized, the same articles being manufactured repeatedly and requiring the same kind of raw material for their completion. A bill of material is prepared for each article manufactured and a copy is given to the stock clerk. When a production order is issued, it is then only necessary to present a

copy of this order to the stock clerk who, referring to his bill of material for information, will know what material to issue.

No material should ever be issued, in such cases, unless it is covered by the bill of material. Of course, it is always possible to use a supplementary or special material requisition for material to replace spoiled or defective goods.

When many different kinds of material are used in the manufacture of one article and the product of the plant has been standardized, these bills of material may be printed in quantities as there is practically no variation in the established specifications.

When the order method of cost-finding is in use, the bill of material given to the stock clerk may specify the order number as well as the number of articles to be manufactured. Then, when the material is drawn out of stock, the clerk should check it with the production order and obtain a receipt for all material delivered. Under the process method of cost-finding, material obtained from stock, as shown by the bills of material, is chargeable to certain definite processes of manufacture, this information being obtained from the bills of material.

Credit for Material Returned

When material is returned to stock, it is necessary to provide for a storeroom credit slip. This form, which is often termed "Credit for Material Returned" (Form 18), should be filled in by the person who returns the goods, and sent to the storeroom with the material which is returned. It may then be attached to the original requisition or, if the original requisition cannot be located readily, this form should be posted and summarized separately in the routine of the cost system.

All material returned should be deducted from the cost of the material which has been charged to the particular order, job, or process.

CREDIT FOR MATERIAL RETURNED TO STOCK

.....DEPARTMENT

No.....

Date.....

Order No..... Process No.....

QUANTITY	DESCRIPTION	FOR OFFICE USE				✓
		Price		Amount		

Credit Account.....

Charge Account.....

Entered on Cost Record.....

Entered on Summary.....

Entered on Stock Record.....

Signed.....
Foreman

Received.....
Stock-keeper

Form 18. Credit for Material Returned to Stock. (Size, 8 x 5)

The credit for material returned should contain full information as to the kind and quantity of such material. Each credit should be properly numbered, dated, and approved, and should contain the signature of the person receiving the material in the storeroom.

Disposition of Issued Material

All material which is issued from the storeroom is not always immediately applicable to definite jobs, orders, or articles. Material and supplies may be transferred in quantity from the storerooms to the various operating departments and be stored there until needed. Therefore, when the material is definitely used in the manufacture of certain definite jobs, orders, or articles, it is necessary to obtain a report from the operating departments, and especially so when substitutions of material are made in these departments. In order properly to record such data, two additional reports are employed—report of material used and interdepartmental material report, discussed below.

Report of Material Used

The report of material used (Form 19)—also termed "Material Report" or "Departmental Material Report"—shows that a certain quantity of a particular material has been used on a definite job, order, or article.

When the order method of cost-finding is in use, all materials used for the manufacture of certain orders should be reported on this form and their costs applied to these orders or jobs. When the process method of cost-finding is in use, all material used should be reported so that its cost can be applied and charged to a definite process or article.

All reports of material used should be properly dated and numbered. They should show the names of the departments in which the material is used and provide columns for record-

REPORT OF MATERIAL USED

.....DEPARTMENT

No.....

Date.....

Order No..... Process.....

QUANTITY	DESCRIPTION OF ARTICLES	FOR OFFICE USE				✓
		Price		Amount		

Charge Account.....
Credit Account.....
Entered on Cost Record.....

Entered on Summary.....
Entered on Stock Record.....

Signed.....
Foreman

Form 19. Report of Material Used. (Size, 8 x 5)

INTERDEPARTMENTAL MATERIAL REPORT

No.....

Date.....

Transferred from.....Dept. Transferred to.....Dept

For Order No..... For Process.....

Quantity	Description of Material	For Office Use				✓
		Price		Amount		

Charge Account.....

Credit Account.....

Entered on Cost Record.....

Entered Summary.....

Entered on Stock Record.....

Signed.....
Foreman

Received by.....
Foreman

Form 20. Interdepartmental Material Report. (Size, 8 x 5)

ing the quantities and descriptions of such material, and also provide a column in which to enter its cost. These reports should be signed by the persons preparing and approving them.

Interdepartmental Material Reports

Interdepartmental material reports (Form 20)—also termed "Material Transfer Reports"—show the quantities and kinds of material which are transferred from one storeroom to another, or from one operating department to another. These reports should provide for recording the departments from which and to which the material is transferred, and for recording the cost of the transferred material. These reports should be properly numbered and dated. They should also contain the signatures of the persons preparing and approving them.

In some plants material requisitions or the report of material used (Form 19), may be employed for the purpose of recording the transfer of material between operating departments.

Pricing the Material

In the preceding discussion of the various material reports, reference has been repeatedly made to the cost of the material. The cost of the material is primarily the market price at the time the purchase is made, to which should be added freight and cartage to give the cost delivered at the yard.

Often raw material is purchased in bulk and has to be sorted and graded, and at such time has to be revalued according to the various grades. This is true especially in the case of feathers, tobacco, and wool in the grease. The invoiced amount of the material purchased must then be adjusted and allocated over the various grades, so that the total amount of the invoice will be in agreement with the costs assigned to the various grades.

Complications sometimes arise in the pricing of scrap material which is used in making by-products. Generally the percentage of scrap to material is used in arriving at the material cost of the by-product. When this is done, the cost of the by-product is then deducted from the cost of the primary product. However, often there is no way of determining the percentage of waste used except at a considerable expense. Under such conditions, the scrap value is estimated and this estimated cost is applied to the by-product and deducted from the cost of the primary product. When, however, it is absolutely impossible to estimate the cost value of the material which goes into the by-product, the amount received from the sale of the by-product is treated as sundry income and is added to the profit from operation without any consideration being given to the material cost of the scrap or waste used in its manufacture.

In considering the cost of material, it is frequently necessary to make a provision for adding the storeroom overhead, as well as the freight and handling cost. When this is done, the storeroom overhead is distributed and added to the material cost, according to a percentage method. In some industries, however, this method does not give accurate material costs, for high-priced material upon which there may be very little storeroom work is then taxed with too large a percentage of the storeroom overhead, while low-priced material which is cumbersome to handle and requires much of the stock-keeper's attention, might not be charged with its share of the storeroom overhead. If it is impracticable to base the distribution upon an arbitrary percentage, the charge should be absorbed in the general operating expenses and in this way distributed over departments.

The market price of material often fluctuates, in which case there are several methods of figuring the cost of the material as it applies to the particular jobs, orders, or

articles manufactured. The one method provides for ascertaining the average cost of all material of a certain kind on hand at such time as any of the material is issued and used. Another method provides for charging the material to the job at the highest value and using up the higher-priced material first. Still another method provides for charging the material cost on the basis of the prices at which the various lots were purchased. This latter method would mean that the quantity of material purchased at the earliest date would be priced at its particular price until this first lot was eliminated; then the price of the second lot would be used until it too was eliminated, and this method would be pursued for each subsequent lot.

No matter what method is adopted, when an inventory

INVENTORY TEST

Department..... No.....

Article..... Date.....

Actual Quantity..... Price $..... Amount $.....

Book Quantity..... Price $..... Amount $.....

Difference Quantity..... Price $..... Amount $.....

Remarks.....

.....

.....

Taken by..... Checked by.....

Priced by..... Investigated by.....

Extended by..... Approved by.....

Form 21. Inventory Test. (Size, 8 x 5.)

of material is taken, it should be figured at cost or market value, whichever is the lower, and at that time adjustment of the material values upon the various stock records may be necessary.

Inventorying the Material

When a complete cost system is in operation, the cost records provide for a perpetual inventory shown by the stock records. If this perpetual inventory is kept, it is then only necessary to test the various items of raw material at certain periods during the year, at which times Form 21 may be used to advantage. The book quantity is then compared with the actual quantity and any discrepancies which cannot be defi-

INVENTORY SHEET

.....DEPARTMENT

No.....

Date.....

Listed by..... Extended by.....

Checked by..... Added by.....

Priced by..... Approved by.....

QUANTITY	DESCRIPTION	√	PRICE		AMOUNT	

Form 22. Inventory Sheet. (Size, 8 x 11.)

nitely located should be adjusted upon the factory records and accounts. When a physical inventory is taken of the raw material and supplies, the items should be counted, listed, and priced at a certain date. All this information may be recorded upon an inventory sheet similar to Form 22.

Summary of Material and Material Reports

Form 23 shows the various steps in the handling of material, and the material reports which are necessary to record material costs.

Procedure in Handling Records

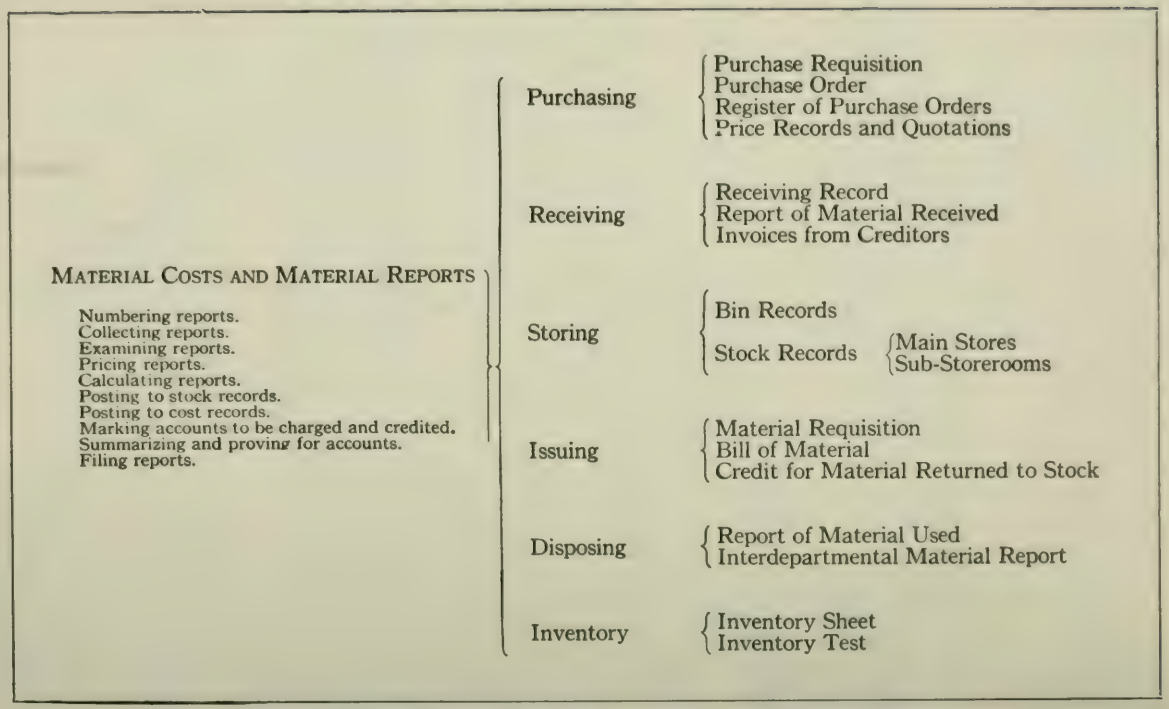
The procedure in handling each material record may be standardized and would then be as follows:

1. Numbering Reports. A definite series of numbers should be allotted to each kind of material report so that the office will know whether or not all reports are being received from the factory. If any of these reports are spoiled or voided in the factory, they should be sent to the office so that all reports can be accounted for.

2. Collecting Reports. It is necessary to provide a well-planned system of collecting the material reports. It may be necessary to collect reports at the end of each day or at the beginning of the next business day, or even several times during the day at such times as the factory messenger makes his usual rounds.

3. Examining Reports. All material reports which are received at the factory office must be examined to see that they are properly numbered and dated, and that they contain a proper description of the material to which they relate. They should also be examined to see that they are properly receipted, signed, and approved.

4. Pricing Reports. The material reports which record



Form 23. Chart Showing Handling of Material and Material Reports

the information as to costs must be priced, these prices being obtained from the stock cards or other price records.

5. Calculating Reports. The material reports which contain the information as to costs must be calculated so that this information can be properly posted to the various cost-summarizing records.

6. Posting to Stock Records. All material reports which show the receipt of material and issuance of material must be posted upon the stock records, so that the movements of each item of raw material can be shown upon these stock records at all times.

7. Posting to Cost Records. The material reports which contain the information as to material cost must be posted to the various cost records—under the order method of cost-finding, to the definite cost records of each job or order; under the process method of cost-finding, to the particular cost record of the definite process or article affected.

8. Marking Accounts to be Charged and Credited. Material reports which record costs give the amounts to be charged and credited to the various accounts, and upon these reports must be entered the information as to the accounts to be charged and credited.

9. Summarizing and Proving for Accounts. After the information has been entered upon the material reports as to the accounts to be charged and credited, they should be summarized so that the total charges and total credits affecting various accounts may be ascertained.

10. Filing Reports. After the information upon the reports has been transferred to the proper summarizing records, they may be filed. It is well to provide for filing each kind of report in a distinctive file; i.e., the material requisitions should be filed separately, also the bills of material, etc. It is advantageous to file these reports, in most instances, according to the report numbers.

CHAPTER VII

WAGE SYSTEMS

Kinds of Wage Systems

The form of labor reports (to be discussed in the following chapter) will depend largely upon the wage system used in a particular industry. As it is necessary for a cost accountant to be familiar with the various kinds of labor reports and devices for recording the cost of labor, it is equally necessary for him to be familiar with the various methods of paying wages. Therefore, the wage systems which are most commonly employed will be explained briefly in the present chapter.

No one system of wage payment can ever be recommended as the best for all conditions. Each has its characteristics which are peculiarly suited to some conditions, and at the same time impossible of consideration under other conditions. The various methods of paying wages considered here are as follows:

1. Day-rate system
2. Piece-work system
3. Differential-piece-rate plan
4. Premium system
5. Bonus system
6. Contract system
7. Profit-sharing plan
8. Stock-distributing plan

Several other wage systems, not so well known but successful under some conditions, are also briefly described in the consideration of those enumerated.

The foundation of these systems is either the time

consumed or the quantity of work done. In other words, the "time" or the "piece" must furnish the basis for any of the systems mentioned. Each of these designated plans is subject to modification, and therefore there are many forms of time and piece methods of paying wages, as well as various forms of premium and bonus plans. The bonus and premium plans are known by various terms, and are often named after the person who first installed them or tried them out.

Day-Rate System

The day-rate system provides for paying each workman a predetermined sum for a certain number of hours' work. Therefore, either a day wage is established, which is the amount of wages a man receives for a day's work consisting of a definite number of working hours; or an hourly rate may be established which, multiplied by the hours in the working day, gives the daily wage. The wage rate under either plan depends upon: (1) the skill called for; (2) the locality in which the plant is placed; (3) the demand for labor; and (4) other special labor conditions which may exist at the time.

The day-rate system is the one most commonly used, and is the original method for paying wages. However, since all other plans have been devised in an effort to get away from it, it is fair to assume that there are gross defects in the system as it stands.

Disadvantages of Day-Rate System. The principal disadvantages of the day-rate method of paying wages may be summarized as (1) lack of incentive to effort, and (2) difficulty of finding labor costs.

Lack of incentive on the part of the workmen is the one thing that has caused the failure of the day-rate system of paying wages. The workman has little or nothing to gain by doing his best, putting his heart into his job, and exerting himself. He is kept up to a certain dead level of performance by

the fear of losing his job, and this is his only incentive to effort. Why should he do more than the man next to him when they are both paid alike? This sort of reasoning may not apply to the one man in a thousand who by sheer exertion forges ahead of his fellow-workers, but it does apply to the great mass of workers in manufacturing industries. The result is shown in both the small quantity and poor quality of the output.

The difficulty of finding labor cost under the day-rate system of paying wages is principally due to the fact that a uniform labor rate per day, or per hour, does not always insure a uniform labor cost per article. The wage rate may remain the same, but the product and its labor cost may vary from day to day, and often this variance is material when comparison is made of the work done by different men.

Applicability of Day Rate. There are classes of labor, however, for which no other kind of wage system is practicable. Where the work is purely a function of time, as in the case of firemen, watchmen, instructors, foremen, factory clerks, etc., the simplest and most practicable method of paying wages is the day- or time-rate system. The work of repair men and men who plan and construct special machinery is also usually paid for by time because of the difficulty of reducing such work to any kind of piece basis. In general, indirect labor is more suited to payment by time than direct labor.

Piece-Work System

A piece-work plan is a system of paying wages on the basis of the amount of work done. A rate is established for the various operations incidental to the production of an article, either as a result of past experience or by means of a special test. Under this plan, the employer makes what he considers a fair estimate of the time required for each operation, or makes a special test, and then bases the piece-work wages upon the results of this estimate or test. If the rate is fair, the entire

arrangement looks so equitable that it may be surprising to learn that in many cases friction and dissatisfaction have arisen from its use. In answer to the question as to why this should be so, an imaginary case may be considered, which, however, is based on actual experience.

An employer, having decided to introduce the piece-work system in his business, sets out to determine the allowance or rate he should make on each piece of work. He and his assistants watch the men and their work for some time; then he makes what he considers a fair allowance for the increased production that he expects will follow under the new plan, and waits for results. Under the stimulus of payment proportioned to effort, the rate of production soon shows enormous gains and the employer frequently finds that production, instead of increasing according to the low per cent he allowed for in determining the new rates, has increased 50%, 60%, or has even doubled. As a result, men who were earning, say, $2.75 per day, are soon earning $4 or more.

By this time the employer is likely to think that his employees cheated him in the beginning, and as a result of this are now receiving altogether too much pay; so he proceeds to cut the rate per piece, and then trouble with his workmen begins. They, on their part, soon discover that they are between two fires; if they produce too little their wages are small, and if they produce too much the rate is cut, after which they must continue to work harder and receive no more pay than formerly. The natural result of this is an agreement between the workmen in each class to limit their production to a certain amount which they consider safe. At this point the piece-work system breaks down and fails in the purpose for which it was introduced.

In the above instance, the conflict of interests between employer and employees is evident. The employer is working for the largest possible results for a given wage scale, and

the men are working to receive the maximum wages for their time and work. The employer, in fixing the piece rate, does not anticipate that wages will increase much over what they were before, or at least not in the same proportion as the production increases; so he fails to see his real gain by the change of method. The workmen, on the other hand, consider that they have been exploited by the cut in the piece rate and are correspondingly bitter over the situation.

It is clear that the critical point here lies in the rate. In the example given, the employer was ignorant as to just what the men could do; and this is the underlying cause of trouble in nine cases out of ten. To establish a satisfactory piece-work system it is essential to set such a rate that, barring excessive business depression or some equally unusual condition, it can be successfully maintained. If the employer wishes to approximate maximum production, he must be prepared and willing to pay more than the ordinary day rate he paid before; and no piece-work plan will attain its object unless he takes this stand. If he can afford to pay a certain amount for the making of an article now, he can surely afford to pay the same amount per article when a larger number are produced per day. This is all the more so because the indirect expenses are increased comparatively little by the increased production in a given period of time, and as these expenses are distributed over a larger number of articles produced, the cost of each article is, therefore, proportionately decreased.

Method of Fixing Piece Rates. The first step necessary to determine the proper rate is to get true records of the work that can be done. In the matter of small, or wholly machine-made articles this is not difficult. If the operations are complex and include much handling of the material, it will be necessary to separate the whole process into simple operations and fix a time for each. The sum of these time rates, plus a

percentage for unavoidable delays, will determine the time to be taken on the article as a whole. These analyses are all-important, as experience has shown that they afford the most accurate and practical method of fixing a fair piece rate. The more carefully the rate is fixed in the first instance, the less the likelihood of disagreement later.

Differential-Piece-Rate Plan

The differential-piece-rate plan is a specialized piece-work method modified by an application of time rate to the work. The idea is to pay a fixed piece rate up to a certain amount of production in a given time, and, if by rapid work the employee can produce more than that amount, to pay him a higher piece rate, either on the whole amount produced or only on the output above the standard set. The considerations and cautions mentioned in the straight piece-work plan are all applicable here, and with double force, since the ideas are the same but emphasized.

The differential-piece-rate plan is specially devised to speed up production where the indirect expenses are high in proportion to material and labor costs. To get the best results in such a case the productive capacity must be made as effective as possible, even at a higher payment for labor cost. What is lost on the high piece rate will be more than made up by the distribution of the large amount of indirect expenses over an increased output.

The point of great importance in the differential-piece-rate plan is the making of a fair rate at its introduction. An ill-judged rate at this time may be fatal and the utmost skill and judgment are necessary to guard against such a mistake. The plan also calls for a well-organized supervising corps, the actual increase of cost for this depending entirely on local conditions, the nature of the shop, and the organization.

Premium and Bonus Systems

The premium system, together with its modifications, differs from piece-work methods in basing the wages primarily on a time rate instead of on the quantity produced, and then paying extra wages for time saved in the operations. It resembles piece-work in that it presupposes a time rate on the process of manufacturing single articles, or on the separate steps in such processes. The fact that it guarantees a minimum wage places it in a more favorable light before employees, and often results in less opposition on their part to its introduction than they show toward the piece-work plan.

Linked to the premium plan and related to it in general principles, are the several forms of bonus plans. In each of these plans there is an increase of pay as the time to do a definite amount of work is shortened; but instead of being calculated directly from the time saved, it takes the form of an increase in the hourly wages for the time actually spent, the rate depending upon the percentage of time gained and increasing in proportion.

The simplest form of bonus system is to pay each workman a daily wage plus a piece rate on each unit in excess of a specified minimum. Thus, a laborer receives $1.50 a day for shoveling earth, and on each cubic yard in excess of 15 cubic yards per day he receives a bonus of 7 cents per yard. If he shovels 25 cubic yards, he receives $1.50 plus $.70, totaling $2.20 for his day's work.

The differential-bonus system is much the same, except that there is an increasing scale for increasing performance. As an example, the workman might receive 7 cents bonus for every cubic yard above 15, and an additional 7 cents bonus for every cubic yard over 20. His day's pay for the work mentioned above would then be $1.50 plus $.35, plus $.70, or $2.55.

The Gantt system of differential payment is known as

"Task Work with a Bonus." A high standard is set, but one entirely possible of attainment. The workman receives a regular day rate and in addition, if he reaches the standard, he is paid a bonus, which may be 25% or 33 1/3% of his regular wages. This system seems to have worked out well in practice; and it is especially recommended as a good transition step from the old day rate to some form of piece-work.

A very important feature of the Gantt plan is the bonus that the foreman gets for every man under him who makes his bonus. Thus, if a foreman had twelve men under him and eight of the twelve made their bonus, the foreman would get, say, 80 cents bonus, or 10 cents for each man. The result in practice has been to make the foreman a teacher of the men, invariably giving his attention to the men below grade in order to get them up to bonus standard.

In the "stint" system the appeal is made to the workman by a gift of all the time he may save. A certain output is assigned as a day's work. If he does it in less time, say 7 hours, he has earned his wages and is free to go home.

The names "merit," "standard operation plan," "gain-sharing," and others, are sometimes given to wage-payment plans worked out in particular shops or industries. If they differ at all from plans here described, it is only in details devised to meet particular conditions.

Since the plans described as "premium" or "bonus" are so closely related in object and principle, they may be grouped together for comparison with other methods.

Introduction of System. In introducing a premium or bonus system, the same caution must be observed as with the piece-work systems. It is essential to be quite sure of the correct standard before the step is taken, if the disastrous results that have followed too high piece rates are to be avoided. If an error is made on the side of too high a scale, it is less costly than in piece-work, because the employer is not working on so

narrow a margin; also the effects of such an error would be more evenly divided.

Contract System

Under the contract system each employee is regarded as a contractor who has a given time in which to finish a definite job. As in the case of the stint system, if he gets through beforehand he has earned his wages, but instead of leaving he undertakes a new contract. In some cases he is penalized if his work is not done in contract time.

When the units of work are large, the foreman often becomes the contractor, and becomes responsible for the completion of the job. There is a wide amount of freedom in the arrangements for wage-paying and profit-making between him and the management. Under the contract system in its simple form, the contractor hires his own men and arranges the work as seems best to him, while the company allows him a certain amount for the job. Anything that he saves out of this goes to him as profit. Strict inspection of his work is necessary, of course, to hold him up to the proper standard.

A very common instance of a contract system of paying wages is in the building trade, where the main contractor has certain sections of the work done by sub-contractors. In the garment manufacturing industry, also, the contract system of paying wages is used where outside laborers do certain operations upon the various garments manufactured.

Profit-Sharing and Stock-Distributing Plans

The profit-sharing plan, as its name implies, provides that the workman shall share in a certain percentage of the profits of the shop or factory as a whole. The stock-distributing plan makes the employee a part owner in the business, and so gives him an interest and incentive to use his best efforts for its welfare.

A special form of profit-sharing which has proved successful in operation, though it can be used only under special conditions, consists in setting a price on every article produced under the supervision of the factory management. The factory is charged only with such expenditures as relate directly to the production of the articles and is credited at the fixed scheduled prices for articles produced whether they are sold or not. At the end of the year, or whenever an actual inventory is taken, the factory account in the ledger shows the difference between the actual cost and scheduled prices—in other words, the factory profit. This profit is then distributed among the foremen of the various departments and sometimes among the employees as well, according to the rate of pay and total wages of each. A penalty is provided for poor attendance and other penalties of various kinds may be incorporated in the plan, according to the conditions under which it is operated.

CHAPTER VIII

LABOR REPORTS

Classification of Labor

In the majority of manufacturing industries the direct-labor cost is more readily determined than is the cost of the direct material. This is especially true when the piece-work wage system is in operation, as under such conditions the direct-labor cost can be computed without any further detailed analysis or compilation than that involved in the operation of the wage system.

As a matter of working convenience, the various labor operations should be classified and a well-defined term be given to each operation. In addition to this, it is often advisable to provide symbols or numbers, so that the different operations on each article manufactured are definitely designated both by operation name and by operation number or symbol. This is specially important where the product manufactured is standard and the operations on the products and parts are continuous from day to day.

Outside and Inside Labor

Two classes of direct labor common in manufacturing establishments are: (1) outside labor, (2) inside labor.

Outside labor is that which is performed outside the particular manufacturing plant, as in the garment industry, where much of the hand embroidery work, and dyeing and bleaching operations are done by persons who do not form part of the regular factory force. In recording labor costs, provision must be made for both outside and inside labor where both exist.

Direct and Indirect Labor

Labor is further classified into: (1) direct or "productive" labor, (2) indirect or "non-productive" labor.

The present chapter deals mainly with direct labor costs and reports, as this is one of the prime elements of cost. Indirect or non-productive labor is treated in later chapters which deal with overhead.

Direct Labor Reports

Labor reports may be divided into two classes: (1) reports used for pay-roll purposes; (2) reports used for cost purposes.

There may be, and frequently are, combinations of these two classes of reports whereby one report will answer both purposes, being used first for pay-roll work and then for cost work.

When separate reports are used for each of these purposes, they should be differentiated by distinctive designations. Reports used for pay-roll purposes are often termed "Time Reports," whereas reports used for cost purposes only are more frequently known as "Work Reports." Time and work reports are also often designated by such terms as "Job Tickets," "Work Tickets," "Day-Work Reports," "Piece-work Reports," "Laborers' Reports," and "Factory Employees' Reports."

Before taking up the form of time and work reports, the time and general method of reporting labor requires consideration.

Time of Reporting Labor

The time of reporting labor depends to a large extent upon the pay-roll system used in a particular plant. This is usually established and takes precedence, the cost accounting requirements conforming to pay-roll requirements. In other

words, the pay-roll period usually determines the time of reporting labor costs by the factory employees. Wages may be paid weekly, twice a month, monthly, or shortly after completion of the jobs, orders, or articles, and reports may be turned into the office from the factory at these times. Where it is practicable to report labor daily this should be done, especially in factories or industries where a large number of employees are working. In those cases where the employees are paid after the completion of a certain job, order, or article, it may only be necessary to have the labor reported at such time as the particular work is completed.

Method of Reporting Labor

Labor usually constitutes the most important element of production cost, and small variations in the methods of handling the men and their reports lead to great differences in results. The importance of the matter is evidenced by the large number of mechanical devices made for the purpose of regulating labor, and for gathering and compiling labor cost, such as time clocks, time stamps, patent time cards, and mechanical labor cost recorders of many different styles. While the writing of the reports by hand is the most common practice, it is sometimes contended that this method is unreliable, especially if the reports are made out by the workers themselves. If, however, the records are prepared by a competent clerk, even though by hand, accurate costs can undoubtedly be established. Where mechanical devices are used, it is clear that they eliminate the imperfections of labor reports prepared by hand; but even mechanical devices may be tampered with and thus falsify the cost figures unless the mechanism and records are carefully inspected.

The complex and variable conditions which exist in manufacturing industries call for many different methods and forms for reporting and recording labor costs. It is often

necessary to use several different kinds of time and labor reports in the same factory according to the different requirements of the various operating departments. So far as possible, standard sizes of time reports and standard methods of reporting labor costs should be adopted. The numerous mechanical devices on the market have, to a large extent, affected the standardization of the forms and methods of reporting labor.

Written reports may be made for:

1. Each individual employee.
2. Small groups of employees—often termed "gangs."
3. Large groups of employees, including employees of entire operating departments.

These reports may include the time and work done upon all the jobs, orders, articles, or processes handled during the period of time for which the report is rendered; or separate reports may be made showing the time and work done upon each job, order, or article, or for each process.

All labor reports made by factory employees should be approved by a foreman or other official and the method of recording this labor should be properly supervised so that true and accurate costs may be obtained so far as possible.

The successful operation of any system of reports depends largely upon the simplicity of the records used and the clearness with which their operation is explained. Clerical labor on the part of factory employees should be reduced to a minimum so as not to take up the time of employees more than is absolutely necessary, and whatever writing is required should be simplified as much as possible by reducing it to the entry of a few figures.

In many lines of manufacture, the conditions are such that a workman may spend only a few minutes on a single job. In such cases it is not practicable to charge this direct labor

cost specifically to the individual job, order, article, or process, and a plan must then be arranged for its distribution over a number of orders. In Chapter V, which deals with factory orders, the method of handling numerous small orders is taken up.

Verbal labor reports are inadequate and unsafe, and should be discouraged in all cases if correct costs are desired. Employees are sometimes permitted to report their time verbally to a department timekeeper who makes the written record, but this is unsatisfactory and unreliable. The tracing of a particular item in dispute is then difficult and often leads to unnecessary argument and disagreement.

Requirements of Labor Reports

The principal points to be considered in choosing or designing labor reports are covered by the answers to the following questions:

1. Is the form to show productive labor only, indirect labor only, or a combination of both? Wherever it is possible to do so, indirect or non-productive workers should report their time upon separate forms. However, if indirect or non-productive time appears upon a productive labor report, provision must be made for summarizing this element of overhead so that it may be included among the factory indirect expenses and be distributed properly.

2. Is the labor report to show time only or both time and cost? Factory employees engaged on productive work should be required to report only the time spent upon the particular job, order, or article, and should not be asked to calculate costs. A clerk stationed in the operating department may calculate the costs upon the labor reports before they are sent to the office.

3. Is the labor report to show the time daily, weekly, twice a month, or monthly? The pay-roll system in use will

give the answer to this question. Before designing any detailed form of labor report, the method of paying wages to the factory employees should also be given careful consideration.

4. Is the labor report to be filled in by a factory employee, a clerk, or will a mechanical device be used? As already suggested, handwritten reports are likely to be inaccurate, and also a certain proportion may be "doctored" by unscrupulous employees. Another important fact is that the writing up of records diverts productive time to clerical labor. Mechanical devices do away with these objections to a large extent. While the installation of mechanical equipment may be costly at first, it saves time and trouble and proves to be less costly in the end. This is especially true if the factory is of any size or the work is complex.

5. Is the report to be used by individual employees, "gangs," or department groups? In small factories a single combination report may be used for all men doing the same class of work. This report can so be arranged as to provide all the necessary information for pay-roll purposes as well as cost-finding purposes. In large manufacturing industries, however, it is often necessary to provide a separate time report for each employee.

6. According to the wage system in use, what information, in addition to time, is required upon the labor report? The answer to this question depends upon whether the employees are paid for "time" or for "piece." If the day-work or premium system is in operation, it may only be necessary to show the time. If the piece-work plan or bonus plan is used, the report should show quantities and time. In both cases the cost and amount of wage is left to the cost clerk and pay-roll clerk. When a combination system of paying wages is in use, an additional column upon the report gives the necessary information as to cost and total wages.

7. Is the labor report to show the time for each job, order, or article, or for several? The labor report may provide spaces upon the one form for recording the time and work done for the several jobs, orders, or articles worked upon during the day, or it may be more advantageous to have separate reports in each case.

To sum up, it may be said that the method of reporting labor should be so devised as to ascertain the cost of any job, order, or article as a whole or any part thereof, or on any operation or process, with the least possible amount of writing or figuring on part of the employees.

DAILY LABOR REPORT

Department..... Date.....
Employee's Name..... No.....
Occupation..... Machine.....

Order No.	Description of Work	Time Started	Time Stopped	For Office Use			
				Elapsed Time	Amount		√

Approved..... Entered on Summaries.....
Wage Rate..... Posted to Cost Sheet.....

Form 24. Daily Labor Report. (Size, 4 x 6.)

Form of Time Report

All time reports should be dated and properly numbered. They should contain columns or space for recording information as to the exact nature of the work done, that is, the designation of the job, order, article, or operation. Columns should also be provided to record the quantity produced, the period

DAILY PIECE-WORK REPORT

Department..... Date.....
Employee's Name..... No.....
Operation..... Machine.....

Article	√	Quantity	For Office Use			
			Rate	Amount		√

Approved..... Entered on Summary.....
Entered on Pay-Roll..... Posted to Cost Sheet.....

Form 25. Daily Piece-Work Report. (Size, 4 x 6.)

of time required to produce it, and the rates and amounts of wages in dollars and cents. The information as to rates and wages is supplied in the office.

It is also important to provide for the approval of some person in authority, and all reports should be examined and

O K'd by this person before they are sent to the office. Furthermore, where labor reports are used both for pay-roll and cost purposes, it is often necessary to provide columns for checking the postings, so that an examination of the reports will show whether or not the information has been properly transferred to the pay-roll and various cost summaries.

As previously stated, time reports and labor reports have

JOB TICKET

Description of Work..... Order No.....

Employee's Name..... No.....

Operation..... Dept. No..... Machine No.....

QUANTITIES	TIME	WAGES
Good.....	Stopped.....	Piece Rate.....
Defective.....	Started.....	Time Rate.....
Total.....	Elapsed.....	Amount.....

Approved..... Cost Sheet Entry.....

Pay-Roll Entry..... Summary Entry.....

Form 26. Job Ticket. (Size, 5 x 3.)

become more or less standardized. A few of the simplest forms are: the daily labor report (Form 24), the daily piece-work report (Form 25), and the job ticket (Form 26). In the light of the preceding explanation, the operation of these forms will be readily understood. They may be developed by the addition of further columns and spaces for recording such special information as may be required for the particular cost and pay-roll system.

In small plants where conditions are simple, it is often

practicable to combine labor reports with the production order, by providing the latter with a column for collecting information as to the amount of productive time spent upon the work covered by the order. Under complex manufacturing conditions it is impossible to use a form of this kind to advantage.

Pay-Roll Exception Report

Labor reports should be made for every factory employee, but in the usual course of events some employees will be ab-

PAY-ROLL EXCEPTION REPORT

.....DEPARTMENT

Date..... No.....

TO PAY-ROLL DEPARTMENT & COST OFFICE:

All employees in my department were present full time with the following exceptions:

.....
Foreman

EMPLOYEE'S NO.	EMPLOYEE'S NAME	REMARKS AS TO IRREGULARITIES

Noted on Pay-Roll.....

Noted on Cost Summaries.....

Form 27. Pay-Roll Exception Report. (Size, 5 x 8.)

sent, others will be tardy in arriving at work, while others will leave for an hour or two during the day or before closing time. Information as to the tardiness and absence of employees should be reported to the office by a foreman or department head upon a pay-roll exception report (Form 27). It is true that both the time-clock records and the employee's labor report should show this information, but in order to call the particular attention of the cost department and pay-roll department to these irregularities, they should also be reported upon the pay-roll exception report.

Pay-roll exception reports should be numbered and dated and show the department in which they originate, the employee's name and number, and all irregularities as to tardiness and absence from the plant. Such a report assists the cost department when summarizing the productive labor for the purpose of comparing its cost with the total amount of wages paid as shown by the pay-roll.

Labor Transfer Reports

Though employees usually work in their own departments, it may be necessary to transfer some of them to another department. When such temporary transfers are made, it is not necessary to change the men's numbers and positions on the pay-roll, but a notification should be sent to the office so that their wages may be charged to the department in which they are working.

The transfer of men from one department to another is generally reported upon a labor transfer report (Form 28). This should be properly dated and numbered, should show the department in which the man is usually engaged and the department to which he has been transferred, and contain an approval of the transfer by some person in authority. It may be necessary to provide columns on the report for recording information as to time, quantity of work done, and its cost

LABOR TRANSFER REPORT

.....DEPARTMENT

No.....

Date.....

EMPLOYEE'S NO.	NAME	TRANSFERRED TO DEPARTMENT
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

Entered on Cost Summaries:

....

Foreman

Form 28. Labor Transfer Report. (Size, 5 x 3.)

Rate Records

It is usual for the wage rates or piece-work rates of factory employees to appear upon the labor reports notwithstanding the fact that in many cases this information is of a somewhat confidential nature. It is obvious that it is necessary to have full and correct information as to the different wage rates of factory employees in both the pay-roll and cost departments. The pay-roll clerk must have access to these rate records in order to calculate the total amount of wages to be paid, and the cost department must use them in working out costs. The rate records should be kept up to date and all increases in pay and changes in piece-work rates should be sent to both the pay-roll and cost departments. Such a record also gives useful information when considering the granting of an increase in pay to employees whose length of service merits recognition.

The form used for keeping rate records (Form 29) shows each employee's number and name, the date he begins his employment, and in the last two columns the dates and the increased rates when changes are made. The information may all be recorded very satisfactorily upon separate 3 x 5 index cards. In some cases it may be more convenient for the cost

WAGE RATE RECORD

.....DEPARTMENT

EMPLOYEE'S NO.	EMPLOYEE'S NAME	WAGE RATE	
		Date	Rate

Form 29. Wage Rate Record. (Size, 8 x 11.)

department to keep wage rates in a loose-leaf binder, the record for all employees of a particular department appearing on one sheet. If this is done, the rate record may then be of letterhead size, 8 x 11.

If the manufacturing plant is large, it is often necessary to have several copies of these records in use in the pay-roll and cost departments. It is then important to see that all changes in rates are recorded upon each copy, and, to insure this, the series should be numbered.

DIRECT LABOR REPORTS

For all jobs, orders, articles, or processes
or
For each individual job, order, article, or process

- Time of Reporting
  - Daily
  - Weekly
  - Twice a month
  - Monthly
  - Completion of job, order, or article
- Kinds of Reports
  - Reports for Pay-Roll Purposes
  - Reports for Cost Purposes
  - Combination Time and Work Reports
  - Pay-Roll Exception Report
  - Labor Transfer Report
  - Rate Records
- Routine of Reporting
  - Preparing Reports
  - Collecting Reports
  - Examining Reports
  - Pricing Reports
  - Calculating Reports
  - Marking Accounts to be Charged
  - Posting to Pay-Roll Records
  - Posting to Cost Records
  - Filing

Form 30. Classification Chart of Labor Reports

Summary of Labor Reports

Form 30 summarizes the various kinds of labor reports and the routine of reporting.

Procedure for Handling Reports

The procedure in handling labor reports may be summarized under the following headings:

1. Preparing Reports. Labor reports should be prepared, so far as is practicable, in the office, and distributed to the factory employees before they start work in the morning. If it is impossible to prepare them in the office, they may be made out before work begins, preferably by the factory clerks of the operating departments, or otherwise by the factory employees themselves.

The first step in their preparation is to enter the date and the report numbers, together with the names and numbers of the factory employees for whom they are intended. Under conditions where work is planned and routed, it is often practicable to enter also the job numbers and descriptions of the operations to be performed by each employee.

After the foregoing details are entered on each report and work is ready to begin, the starting time is recorded and, as soon as a job is completed, the time it is finished, if this information is required. If the quantity produced is required, this should be entered upon the record by the employee or factory clerk and be approved by an inspector. If any additional information as to time, quantity, or articles produced is desired, this should also be entered. An important point to observe is that entries should be made either before work starts or as soon as possible after its completion. They should not be postponed until the end of the day, when the tendency is to record the data hurriedly, and too often to rely upon inaccurate memory.

The time tickets which are used in connection with time

clocks for pay-roll purposes should also be prepared in advance as far as possible. The time in and out is, of course, recorded by means of the clocks as the employees enter and leave the plant.

2. Collecting Reports. Wherever it is practicable, the labor reports of the preceding day should be collected by factory messengers the first thing in the morning. Under complex manufacturing conditions it may be necessary to collect them at intervals during the day, the collection trips being timed as required. The reports for each department should be kept separately, but, if it is impracticable to sort them in the factory, they may be classified in the office.

3. Examining Reports. The labor reports should be approved by a foreman, or a factory clerk who is authorized to do so, before they are collected. Afterward they should be examined in the office to see that they are properly numbered and dated, and that they contain all information required for the accurate compilation of the pay-roll, cost sheets, and cost summaries.

4. Pricing Reports. The entry of the rates and amounts earned may require reference to rate cards giving the various wage rates which may be based on time, piece, premium, or bonus. Accuracy in the pricing of the reports is essential, and if an inexperienced clerk is in charge of the work his entries should be carefully checked.

5. Calculating Reports. After reports have been priced, they are ready to be calculated. This includes the calculation of the time or quantity, and the amount of labor cost to be charged to each job, order, article, or process. If the day-work plan of paying wages is in operation, the total hours applied to the various jobs worked upon during the day should equal the total working hours of the day.

Experience shows that the calculation is facilitated by reporting any fractions of an hour in tenths or twelfths; in other

words, when the tenth of an hour period is used in reporting time, a six-minute charge is the lowest amount of time applicable to any job. The division of the hour into tenths permits of decimal calculations which save considerable time in figuring the reports.

The amount of wages due may be readily calculated by means of a wage rate table. This is compiled by entering the various wage rates paid across the top of a sheet at the head of separate columns. At the extreme right of the sheet, and on the horizontal lines, the various periods of time—five minutes, or six minutes, quarter of an hour, half hour, and so on—are entered and extended at the various rates, so that the wages for any period of time and for each rate are shown on the table.

Reports should be calculated by experienced clerks so as to guard against errors. If the amount shown on an individual report proves with the daily wage, this may be taken as proof of its correctness. To guard against error, however, whenever piece-work or premium or bonus systems of payment are in operation, it is advisable to check all calculations, particularly when no mathematical proof of the figuring is possible.

6. Indicating Accounts to be Charged. After the reports have been examined, priced, and calculated, they should be arranged or marked so that the proper ledger accounts may be debited with the labor costs chargeable against them. This is often done by marking each report with an account number. If, however, the department number and designation are recorded upon the report, it will not be necessary to make an additional specific mark for the account to be charged, as the department number and name will give all necessary information for posting. In some instances it is possible to assign a definite series of numbers to the employees in each department, in which case these numbers indicate on the reports the de-

partment in which the employees are working and the account against which their wages are to be charged.

7. Posting to Pay-Roll and Cost Records. Where the labor reports cannot be made to serve the dual purpose of work records and pay-roll records, separate time reports should be made out for pay-roll purposes, the labor reports being used for cost purposes only. In this case the cost department is only interested in the time reports in so far as the information shown thereon proves at the end of the pay-roll period to be in agreement with the time recorded on the labor reports.

Posting to the cost records consists in entering the labor cost upon summaries. The total of this should be in agreement with the total wages paid, as shown by the pay-roll records—the analysis of labor costs being prepared at the same time that this proof is established. In addition, the information shown upon the detailed labor reports is posted to the cost records upon which is compiled the cost of the various jobs, orders, articles, or processes.

8. Filing. Labor reports may be filed by date, department, employee's number and name, or by factory job, order, process, or operation. Any system which permits of a ready reference to the reports is all that is required. Under loose manufacturing conditions, the records are often tied up in bundles and relegated to a shelf in a general storeroom. This method of filing entails a considerable loss of time, if it is necessary to refer to the reports at a later date, as is frequently the case. A factory foreman, for instance, may suspect the cost department of errors in posting and cannot be convinced until he sees the original labor reports. It is obvious that a proper filing system saves both time and trouble.

CHAPTER IX

DEPARTMENTAL APPLICATION OF OVERHEAD

Classification

As stated in Chapter II, the items of factory overhead or indirect charges consist of three principal subdivisions:

1. Indirect material
2. Indirect labor
3. Indirect expense

These overhead items do not affect all departments alike Some of them apply to all and others only to particular departments. This chapter covers their application in all cases.

Indirect Material

Indirect material usually includes the following:

1. Material which cannot be applied as a direct charge
2. Supplies
3. Scrap or waste material
4. Small perishable tools and dies

1. Material Which Cannot Be Applied as a Direct Charge

While certain classes of material sometimes used in manufacture should properly be applied as direct material, this is not always practicable because of the clerical labor involved in making the direct charge. (See Chapter II.) In such cases these items are preferably treated as a portion of the factory overhead under the caption of indirect material. If any of the items so treated are used in only one operating department of the plant, they are chargeable as part of the overhead of that department alone, and not as general overhead.

The treatment of direct material items in this manner has been subject to severe criticism by cost experts who apparently place theory above common-sense. It is not a question as to what is the correct method according to theory, but as to what is the most practical way. Manufacturing conditions cannot be changed nor should they be burdened with unnecessary red tape for the sake of "system."

2. Supplies

Factory supplies are usually required in every operating department of the plant. They consist of coal, waste, oil, brooms, rags used for polishing, and miscellaneous supplies peculiar to the operating departments of various lines of industry. In large plants the supplies used during the year amount to a considerable sum. They are often requisitioned for use in each department from a general or supplies storeroom, which is the most satisfactory method. In small plants this plan is not always practicable; here supplies are usually purchased for each operating department, the charge to the department being made direct when the purchase is made. Care must be exercised, however, that too much is not charged during any one particular month, as for instance, when a stock of miscellaneous supplies is purchased for a six months' period. In such a case, a monthly charge must be made.

When it is impossible to charge supplies directly to departments, they must be apportioned more or less arbitrarily.

3. Scrap or Waste Material

Scrap or waste material consists of what is left after grading, cutting, trimming, sizing, polishing, or treating the direct material. In industries where the amount or scrap is negligible, its cost may be absorbed in the direct material cost and thus be included in the prime cost. Where the scrap material is an important item, a careful account should be kept of it in

order to guard against the scrapping of too much material. Its dollars and cents cost should be determined and charged to a Scrap Material account. When the scrap cannot be utilized, its cost may be absorbed in the overhead of the particular department in which the waste occurs. Often, however, a source of income is derived from the sale or other utilization of material which has been scrapped.

If the original cost value of scrap material has been absorbed as part of the direct material cost, any income derived from its sale should be credited to a "Sundry Income" account and be included as part of the additional income in the profit and loss statement of the business. However, if the cost value of the scrap material sold can be ascertained, this cost value should be deducted from the amount received and the profit or loss upon this scrap material may then be ascertained separately. Where the amount received from the sale of scrap material is small as compared with the total cost of material scrapped, the income received on account of its sale may be credited to the overhead account, thus reducing the total overhead charge applicable to the operating departments.

Where scrap material is used in manufacturing a by-product or in making other articles for sale, it becomes a direct material charge. Its cost should then be ascertained so that a complete scrap stock record may be installed. When this procedure is followed, scrap will be requisitioned out of stock, and its cost will then become a direct material charge to be applied to the particular articles manufactured from the scrap.

Under some manufacturing conditions it is impossible to obtain the cost of scrap material, and still this material is valuable for use in the manufacture of other products. This is true in the embroidery industry, where the scrap cloth is used to manufacture small embroidered pieces. The cost of such scrap cannot be readily ascertained, and therefore, as a rule, no cost is charged, as the cloth is obtained from scrap which

is practically worthless for any other purpose. In cases of this character, an arbitrary value is sometimes placed upon the scrap material. This value is credited against the cost of the original article and charged to the material cost of the smaller article manufactured. If the articles which have been manufactured out of the larger pieces of cloth cannot be credited with the charge made to the cost of the small embroidered pieces, the credit must be made to a "Sundry Income" account or an account of a similar character.

4. Small Perishable Tools and Dies

Where small perishable tools are employed in manufacture, they may be included as an item of overhead, chargeable to the particular department in which they are used. If special tools or dies are purchased or manufactured for a particular job, order, or article, the cost of such tools or dies may be applied to the cost of the job, order, or article for which they are procured. However, if these tools or dies are retained and have some value after the completion of the particular job, order, or article, an allowance should be made and a credit entry passed to the cost of the completed article. This credit allowance will usually be made on the basis of scrap value.

The value of any tools which are purchased or manufactured for continued use should not be included in the factory overhead unless they are perishable in character. Tools or special dies which can be used for a long period of time should be capitalized at a conservative value. Any deterioration in the value of these tools or dies should be considered when establishing depreciation rates applicable to capital assets.

Indirect or Non-Productive Labor

Indirect or non-productive labor includes the following:

1. (a) Lost time and idle time of productive workers
   (b) Time of helpers, sweepers, truckers

2. Supervisors and foremen
3. Superintendence
4. Inspection (when not considered as a direct labor charge)
5. Factory clerks
6. Employees on defective work
7. Employees on experimental work

In some manufacturing industries all such labor is grouped under the one caption "Indirect Labor," and therefore, whenever it is necessary to investigate an increase in indirect labor expenditures, a detailed analysis is necessary in order to ascertain the component parts of these expenditures. This condition can only be remedied when a basis for true comparison is obtainable, and such an important overhead item as indirect labor should be classified very completely according to its constituent parts. In small manufacturing industries it may not be necessary to have as elaborate a classification of indirect labor, and in these cases the foregoing classification may be somewhat abridged.

Where bonuses form part of the wage payment for either productive or non-productive labor, it is often impracticable to charge these payments to the accounts to which the original wages were charged. Where the bonuses are based directly upon increased production, they should be charged as part of the regular wages. If the bonuses are merely intended as an incentive to regular attendance or increased production, the amounts so paid should be charged as factory overhead to the departments in which the employees are engaged. If they cannot be so apportioned, they should be charged to a special account and distributed over the various departments affected, upon some arbitrary basis.

Wherever bonuses are in the nature of gifts and are exceptional, they should not be treated as part of the factory

overhead, but should be considered either as part of the administrative expenses of the business or as a distribution of profits.

1. (a) Lost and Idle Time of Productive Workers

The productive employees of manufacturing plants often lose considerable time while awaiting assignment to definite pieces of work, or while repairs are being made in the factory, or because of unavoidable interruptions to the routine of production. The idle or non-productive time which is the result of these delays should be charged to the department in which the employees are idle.

While it is true that as much of the time of employees as possible should be applied to some definite job, order, or article if actual costs are to be ascertained, this does not mean that idle time, lost because of non-assignment of the laborer or because of a temporary shut-down of the factory or a department of the factory, should be applied and absorbed as a direct element of cost in order to charge all time to some particular article. It is far more important to know the amount of this idle time than to have all productive time treated as a direct element of cost. The wastage of time can only be avoided if the time so lost is properly recorded. Labor reports, therefore, should always provide for recording the idle time which cannot be charged to orders.

Under some manufacturing conditions, factory employees are often paid an additional amount of wages for overtime or for special work. In some cases, this extra wage allowance may be properly chargeable as a direct labor cost, but in other cases this excess of wages must be absorbed in the factory overhead. If overtime work is a common occurrence in a large plant and it is impossible to treat it as a direct labor cost, the additional wages are properly included as a non-productive labor item.

1. (b) Time of Helpers, Sweepers, Truckers

Most manufacturing plants have certain employees who devote all their time to work of a non-productive character, such as helpers, sweepers, and truckers. The time of such employees can only be applied in an indirect manner, and therefore must be considered as part of the factory overhead. As far as possible the time of these employees should be charged to the department in which they are ordinarily engaged. If, however, they are transferred from one department to another, it may be necessary for them to keep separate and distinct time records for each so that their time will be charged correctly. If it is impossible, in smaller plants, to charge the wages of these employees directly to operating departments, the total amount may have to be distributed as seems most equitable.

2. Supervisors and Foremen

The charge for supervisors or foremen in manufacturing plants is a more or less fixed item. This charge is very readily determined for each operating department when each is supervised by its own foreman or supervisor. Under some conditions, however, foremen and supervisors devote their time and attention to different departments. In such cases an arbitrary distribution of the charge may have to be made, unless it is possible to establish a time report for these employees so that their time may be equitably distributed to each department to which they devote their attention.

3. Superintendence

Superintendence does not include the items of supervision or foremanship, but is restricted to such items as the wages paid to the general superintendent, assistant superintendent, and production manager. These items apply to the entire plant and in most industries cannot be localized and charged to a particular operating department. Therefore,

they should be absorbed in the general operating expenses and be distributed to the departments upon some arbitrary basis.

4. Inspection, When Not Considered as a Direct Labor Charge

An inspection department is often a necessity in some manufacturing plants, in which case the inspection time may be treated either as a part of the direct labor cost, or included among the factory overhead expenses. If a departmental inspector is employed, the charge could properly be applied to the department in which he is engaged. Frequently, however, inspectors travel from one department to another. It is often possible to keep complete time and work reports for the actual work done by these inspectors so that, using these reports as a basis, their time may be charged to particular departments.

Where there is a general inspection department which cannot be treated either as forming part of the direct labor cost or as a departmental overhead charge, the cost of its up-keep must be charged as equitably as possible to those departments the work of which has to be inspected.

5. Factory Clerks' Salaries

Factory clerks' salaries include those of clerks who are engaged in the operating departments, cost department clerks, storeroom clerks, pay-roll clerks, and miscellaneous clerks employed in various non-productive capacities. Their salaries should be charged to the respective departments with which they are connected. The salaries of those who work in the productive departments should be charged directly thereto. The time of factory clerks who are not wholly occupied in one operating department, should be reported so as to permit their salaries to be distributed as seems to fit the needs of the case.

In considering whether a clerk's time is properly chargeable as part of the factory overhead, the actual facts in the matter must be reviewed. If the work done by the clerk is

of an administrative character and has no connection either directly or indirectly with the producing of the goods, the time should be applied as part of the administrative expense. If, however, a clerk is connected with the factory, and assists either directly or indirectly in the actual production, his time should be absorbed in the factory overhead.

6. Employees on Defective Work

The treatment of defective work, as a whole, depends upon the nature of the product manufactured and upon the amount and kind of defective work. Under some manufacturing conditions, many slight defects in the product are corrected by two or three men who devote all their time to this kind of work. In the language of the factory they are called "doctors," in the sense that they remedy defects in the product.

Under conditions where standard products are manufactured, the time of these employees cannot be applied directly, and therefore it must be absorbed in the factory overhead. If the time of these employees can be applied to a particular operating department, it should be absorbed in its overhead. If, however, the cost of correcting the defects is a general operating expense, it must be arbitrarily distributed over the operating departments.

When the correction of such defective work necessitates a considerable amount of extra labor and involves an additional routing of the product through the factory departments, the defective work should be recorded upon a separate factory order and the cost of correcting these defects should be applied separately in the same way that the costs are applied to any other special order.

7. Employees on Experimental Work

Just as there are employees who devote all their time to defective work, so there are employees who devote all their

time to experimental work with a view to improving the product, process, or equipment. The salaries of such employees, whose time cannot be treated as productive and applied to any definite job, order, or article, must be treated as indirect labor and absorbed in the factory overhead.

The time of these experimental workers is sometimes confined to a certain definite operating department, affecting only the articles there manufactured. If, however, this is not the case, and the time charge cannot be specifically applied, it must be distributed as overhead.

If the experimental work is costly in character and embodies the improvement of some one particular process, article, or machine, a factory order should be issued for such work, and all applicable costs for material, labor, and overhead should be charged to that particular order. This will give the total cost of the experimental work on that order. After ascertaining this, it can then either be capitalized or be charged to the operating department or product manufactured by being absorbed in the overhead for a definite period of time.

Indirect Expenses

The items of indirect expenses which compose the factory overhead may be classified as follows:

1. Rent
2. Insurance—fire and liability
3. Taxes
4. Interest
5. Power
6. Light
7. Heat
8. Freight and cartage inward, when not considered as a part of direct material charge
9. Over, short, and damage

10. Miscellaneous factory expenses
11. Depreciation
12. Maintenance, repairs, and renewals

Items numbered 1 to 10 will be separately considered in this chapter, leaving for discussion in the following chapter the important subject of depreciation and maintenance.

1. Rent

The item of rent is more or less fixed as to amount. This item is applicable to all departments of the business, including the selling and administrative as well as the various factory departments. The most practical method for the distribution of the rent charge is that which is based upon the proportion of floor space occupied. Consideration must always be given, however, to the more desirable floors and the more desirable locations of the different departments. In other words, the same rate per square foot should not be used throughout the entire plant for every floor. On the contrary, a sliding scale should be established so that the various locations throughout the plant will bear rates per square foot depending upon their desirability.

When the rent item is fixed, and the space assigned to each particular department is also fixed, a schedule of the rent charges may then be established; and this fixed schedule may be used until changes in the amount of rent, or changes in departmental space, require a new distribution of this charge.

When the building is owned, items in lieu of rent, such as interest on mortgage and taxes on real estate, may be distributed over the various departments of the plant upon the basis of the floor space occupied by each.

2. Insurance—Fire and Liability

The fire insurance charge includes the amount paid for insurance upon buildings, equipment, and merchandise stock.

When blanket policies covering insurance on all of these items are issued, the entire amount of insurance paid is to be absorbed in the factory overhead and it is often difficult to establish a basis for the charge to the various departments of the plant. The total value of the machinery, equipment, and material stock carried in a department, plus a value for the building in which the department is located, usually provides a satisfactory basis for the distribution of the insurance charge.

When separate insurance policies are issued for the stock, the buildings, and the equipment, the insurance charge may be apportioned more accurately. The insurance of the stock may be distributed to the departments upon the basis of the value of stock carried in each; that of the equipment, on the valuation of the equipment installed in the departments; and the insurance on the buildings, by some arbitrary method.

Liability insurance affecting factory employees should be included in the factory overhead and distributed according to the amount of wages chargeable to each department.

3. Taxes

Taxes are varied in character and include local, city, and town taxes, state taxes, and United States Government taxes. Income, excess profits taxes, and capital stock taxes are not proper charges against cost and should not be included in the factory overhead. They are deductions from the undivided profits and should be so treated upon the financial records.

Real estate taxes may be considered as payments in lieu of rent, and as such distributed to the departments affected upon the basis of the space occupied by each. Taxes upon the valuation of the machinery and equipment may be distributed according to the value of such machinery and equipment used in each department of the plant. If these items cannot be distributed upon the basis of floor space or value of equipment, they must be applied upon some arbitrary basis.

4. Interest

Whenever interest on the value of plant, machinery, and equipment is to be treated as part of the cost, it should be included in the overhead of the various departments, the distribution being made in proportion to the valuation of the equipment used in each.

The question of interest in its relation to cost of production has probably been discussed at more length than any other subject in cost accounting, and concerning no other subject is there such a wide difference of opinion. From statistics gathered in this connection, it would appear that of the accountants who have expressed an opinion on this subject, about 60% are in favor of, and about 40% opposed to, the inclusion of interest as a cost of production. It should be noted, however, that 90% of the accountants who have specialized in cost accounting advocate its inclusion as a part of cost, and the same percentage prevails among manufacturers generally. The writer's personal opinion is that the full expense of operating a plant should be charged against the cost of the product, if true costs are to be obtained. As it is just as necessary to pay for buildings, land, and machinery as it is to pay workmen for manufacturing a product, interest on the capital investment should be considered in ascertaining costs, especially where the value of the investment required for the manufacture of some articles is greater or less than that required for the manufacture of other articles.

To illustrate this point it may be assumed that a factory is producing articles of different kinds, some of which necessitate the use of expensive machinery or equipment, while others are largely the product of hand labor, or cheap machinery. If the different values invested are not taken into consideration, the distribution of the indirect expenses will not show the true variation that exists in the cost. An unequal burden is clearly the result of the differences in investment, and, since

these inequalities are a direct result of using different kinds of equipment, it seems that interest on the investment in equipment should be considered as one of the elements of cost.

Of course, if the equipment is uniform, or if all the output passes through the same processes, there is no essential difference between including interest as a cost or leaving it for later consideration when fixing the selling price of the product. Since, however, in either case the amount invested must be considered in determining the selling price, there still remains the necessity of determining the method of calculating the interest. This may be based on values, or on time, or on other conditions of manufacturing. The difference of opinion, then, centers on what is the best method of applying this charge to the cost; that is, whether it should be included among the regular cost items or be added to the cost in a statistical report.*

The writer's attitude on this question has, at times, been misunderstood. He has never advocated the charging of interest on the capital invested as a whole, but only on the permanent or fixed assets used in manufacturing; that is, land, buildings, machinery, and equipment. He has never advocated interest on inventories of raw material and supplies, accounts receivable outstanding, or any other form of floating capital investment. Ignoring all economic arguments in connection with this subject, and confining it strictly to its relation to the fixing of a selling price, the writer is firmly of the opinion that it is necessary to consider interest in this con-

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*To attempt to cover the arguments for and against the inclusion of interest as a cost would require a volume. Readers who wish to study this question will find the following references helpful:

Factory Accounts, by Garcke and Fells, page 140.
Commercial Organization of Factories, by H. Spencer, page 150.
Cost Keeping and Management Engineering, by Gillette and Dana, pages 141 and 142.
Factory Organization and Administration, by H. Diemer, page 212.
Cost Accounts, by L. W. Hawkins, page 109.
Cost Keeping and Scientific Management, by H. A. Evans, page 37.
Depreciation and Wasting Assets, by P. D. Leake, pages 53 and 54.
Bookkeeping and Cost Accounting, by Wm. Kent, page 128.

nection in order to determine what would be a fair profit in a given case.

Possibly the majority of the opponents of interest as a manufacturing cost would not object to its inclusion in the selling price. Therefore, the following method of handling the problem may be recommended as a compromise between the two theories.

Wherever it is desirable to include as a cost the interest on the capital invested in fixed assets, two special accounts should be opened in the ledger: (1) Interest Reserve account, and (2) Interest Income account. The interest, calculated for a current month, is charged as a cost in the same manner as any other cost item, while the total interest so charged is credited to Interest Reserve account. This account, of course, should not include or contain any interest charges which are actually paid for borrowed capital.

At the end of the current month, the amount of interest, charged as a cost on the product actually shipped during the current month, should be ascertained and charged to Interest Reserve account, the offsetting credit being to Interest Income account. Any interest items affecting manufacturing costs which have been actually paid or received would also be charged, or credited, to Interest Income account. The balance of Interest Income account would then be credited to profit and loss, while the balance of Interest Reserve account would represent the interest on goods in process and finished stock. When the monthly financial statements are prepared, the Interest Reserve account is deducted from the inventory of goods in process and finished stock as shown in the balance sheet. In this way, interest is not included as part of an asset in the financial statements, thus answering the principal objections to opponents of interest as a cost. At the same time, the principle of charging interest as a cost for the purpose of fixing a fair selling price is adhered to.

5-7. Power, Light, and Heat

Whenever a factory operates a separate power plant, the costs of this department should be compiled and ascertained separately. The total costs of the power, light, and heat furnished to departments are distributed upon the basis of the space occupied, and according to the meter readings and horse-power hours of the various machines. When it is difficult to separate the charges for light, heat, and power, the items may have to be combined. When light and power are purchased, readings and the horse-power of the various machines operated again furnish the necessary data for the distribution of these charges. In this case the heat is usually generated within the plant and its cost can be ascertained separately. The above items should be apportioned arbitrarily only when the more accurate information furnished by horse-power measurement or meter readings cannot be obtained.

8. Freight and Cartage Inward

It is often feasible to treat the item of freight and cartage inward as an element of direct cost, by adding it to the material price, and in that manner treating it as a part of material cost. However, under some manufacturing conditions, this is not practicable. The item must then be treated as overhead and applied to the various departments according to the value of the materials and supplies purchased. Freight and cartage inward on machinery and equipment should, in all cases, form a part of the cost of such machinery and equipment.

An objection is often raised to the addition of freight and cartage inward to the material cost as this necessitates changing the unit price of the material purchased. The price is then apt to be a fractional amount. Before the addition, the unit price may have been an even amount of dollars and cents, thereby simplifying the figuring of material costs. After the

addition much more labor is involved in cost computation.

Even if it is possible to add freight and cartage inward to the cost of direct material, it is not always practicable to add it to the cost of supplies. Supplies are often received in bulk and consist of a number of articles. When freight and cartage is paid upon this bulk, it is difficult to distribute the charge with accuracy over the various items purchased. Therefore, in most cases, freight and cartage paid upon incoming supplies must be distributed over departments on some arbitrary basis.

9. Over, Short, and Damage Account

In addition to the waste and scrap involved in processing material, as previously mentioned, a shrinkage or loss in its weight often occurs which cannot be accounted for. All shrinkages or losses which cannot be properly explained should first be charged to "Over, Short, and Damage" account, and then to the department in which the loss or shrinkage occurs, if this is possible. Failing this, they may be apportioned in any equitable manner.

Over, Short, and Damage account is often used for the purpose of making credits for adjustments which are necessary when material increases in quantity for some unknown reason, although care should be exercised to see that these increases do not offset losses. These should be properly investigated with a view to their remedy. In other words, a credit entry should not be passed for the express purpose of reducing the debit side of the Over, Short, and Damage account. It is important to investigate separately all losses charged to this account, so that remedies may be applied for correcting defects and stopping leaks.

10. Miscellaneous Factory Expenses

Some items of expenses, such as system work, cost analysis and investigations, and special expenditures which cannot be

classified under any of the headings previously mentioned, are often listed as "Sundries" in an analysis of factory indirect charges and charged to a "Sundries" or "Miscellaneous" account. This account should not be used as a dumping ground for all unclassified items. In practice, Sundries account is often found to contain important items of overhead the identity of which is hidden in a number of miscellaneous charges. The Sundries account should permit of a ready analysis, so that the component parts may at all times be investigated and any item wrongly included therein charged to its proper account.

Whenever it is possible, miscellaneous factory expenses should be charged to the departments in which they originate, if a proper departmental overhead rate is to be established. Where it is impracticable to charge these items directly to departments, they must, of course, be distributed on some arbitrary basis.

CHAPTER X

DEPRECIATION AND MAINTENANCE

Depreciation

Depreciation charges are applied to departments upon the basis of the total valuation of the equipment in each. The loss of value due to depreciation is undoubtedly one of the most difficult of all expenses to reduce to accurate figures, because of the numerous factors to be taken into consideration. The best method of arriving at the rate for depreciation is to estimate the life of the asset in question and then write off a certain per cent of its value each year. In fixing the rate, the residual value of the asset at the end of the period should always be considered. In other words, the total value of the article should never be entirely written off, as there always remains some scrap or sales value.

Effect of Repairs and Renewals on Depreciation

One factor of depreciation needs to be noted in particular; this is the amount spent for maintenance in the form of repairs and renewals. It is clear that whatever is spent to counteract the effect of age and use tends to lessen the amount of depreciation. Theoretically, if a factory were maintained in its original condition, its maintenance cost would exactly counterbalance the depreciation. However, this is quite impossible in practical operation. Repairs are made only as efficiency requires. The plant as a whole may be gradually depreciating without its efficiency being impaired to any appreciable extent. In some cases the renewal of parts may increase the value of a machine to a point beyond its original cost, as where ordinary cast-iron parts are replaced by steel. This extra expense

should not be considered as an offset to depreciation, but as an additional investment of capital. Just where the line between the two is to be drawn must be determined by the circumstances of the case.

Factors to be Considered in Fixing Rates

The rate of depreciation depends upon many different and variable factors, some of the most important of which are:

1. Nature and construction of buildings and equipment, together with their condition.
2. Deterioration of plant in general and of machinery in particular, due to wear and tear.
3. Amount spent for maintenance in the way of repairs and renewals.
4. The invention of new methods or new machines which may or may not entirely replace the old ones.
5. Permanency of business, and likelihood of increase or decrease in the same.
6. Amounts previously written off for depreciation.
7. Obsolescence.

There are many additional factors, such as amortization, peculiar and excessive uses of machines, rate of production, idleness of plant, etc., all of which enter into the problem.

Schedule of Depreciation Rates

The following schedule of depreciation rates represents a classification used by one of the largest manufacturing concerns in the country. The majority of the rates have been determined at various conferences held to consider the question. They are endorsed by the writer as they are the results of long and careful study of this subject. The rates apply to a period of one year.

	Approved Rates
Land:	
Dams and waterways	1½%
Roadways and sidewalks	4
Paving and pavements	4-10
Wells—gas	10
Wells—water	3
Buildings:	
Housing:	
Dwellings—frame	3
Tenement houses	5
Hotels	5
Fire-proof:	
Concrete	2
Brick	2½
Brick and concrete floors	2½
Main buildings—brick and concrete	2-2½
Steel frame—non-combustible roof, and corrugated iron walls	3
Steel with corrugated sheet iron or steel plate	5
Corrugated iron—steel frame concrete floor	3
Reinforced concrete, or steel and tile	2
Stone, brick, concrete with or without steel, first-class stone and brick	2
Mill or slow-burning buildings—brick, steel, and wood, or brick and wood	3
Non-fire-proof:	
Outbuildings	7½
Wood	5
Substantial wooden buildings	5
All-wood structures—well built	5
All-wood structures—cheap material	7½
Steel frame—wooden roof, and corrugated iron walls	5
Steel or corrugated sheet iron with wood	5
Corrugated iron—wood frame and floor	5
Corrugated iron—wood frame, concrete floor	5
Corrugated iron—steel frame, wood floor	5
Concrete block with wooden roofs and floors	5
Miscellaneous structures:	
Hose reel and guard houses	15
Pine swamp (magazines)	2
Frames, stables, and sheds	5
Bins—concrete and brick	5
Bins—wood alone	20

Trestles—steel (not including rails or ties)	3 1/3%
Trestles—wood (not including rails or ties)	6 2/3
Docks, piers, and wharves	3 1/3
Dry docks—basin	2
Dry docks—floating	5
Ship sheds	3 1/3
Fences—wooden	10
Fences—wooden and wire mesh	8 1/3
Pump	5
Retaining walls	2-5
Tunnels, underground piping, vaults, and general conduits	5
Stack—brick	3
Building Mechanical Equipments:	
Plumbing:	
Inside piping, and water and sewer piping	6
Heating and ventilation	5
Sprinklers	5
Electric light and power wiring:	
Departmental wiring—net additions	6
Inside wiring	5
Elevators	5-7½
Fire alarm and fire prevention apparatus	5
Refrigeration	7½
Plant Power and Large Equipment:	
Power machinery	6
Steam plant equipment:	
Steam power plant, including boilers and piping	6
Boilers	5
Boilers—including boiler house equipment such as economizers, feed water heaters, injectors, damper regulators, etc. (does not include feed water pumps)	5½
Water purifying plant	5½
Engines	5
Steam turbines	5
Condensers	6
Piping	7½
Superheaters	5
Stokers—fixed parts	5
Stokers—moving parts	20
Electric plant equipment	6
Dynamos	5
Electric machinery—generators	5
Electric machinery—motors	5½
Electric motors and apparatus	10
Storage batteries	6

Sub-station equipment	5 %
Switchboards—telephone central	5
Switchboards—telephone P. B. X.	7½
Switchboards and wiring	5
Switchboards, main wiring, and conduit	5
Aerial lines	5
Cables—underground (high tension)	5
Electric wiring	5
Conduits	2
Conduits, manholes, and paving	5
Transformers—station service	5
Gas and oil plant equipment:	
Engines—gas and oil	7½
Fuel oil system	7½
Oil lines	5
Steel gas-producers, piping, etc.—including gas washers, gas scrubbers, gasometers, dust catchers, and dust collectors	6 2/3
Brick gas-producers	6 2/3
Gas supply system	6 2/3
Gas plant equipment	6 2/3
Pneumatic plant equipment	6
Compressed air system	7½
Air compressors	5
Hydraulic plant equipment	6
Water lines	5
Pumps	7½
Miscellaneous steel mill, forging and machine shop equipment:	
Steel work—including air, oil, and water tanks, stand pipes; gas, hot, and cold, blast furnaces and bessemer plant; scrap drops, crane runways (when not included as part of buildings), bins, racks, poles, foot bridges, steel stack, wire screening, drop balls, coke, and ore pockets; heating pockets, cribs, skip hoists, ladle rests, smoke boxes, etc.; plate carriers, etc.	4
Stack—steel	8
Dolomite and lime kilns, rotary nodulizing kilns	6 2/3
Steel ladles, charging boxes, charging barrows, etc.	20
Cranes—wooden	6 2/3
Cranes—electric, hydraulic, steam, and hand power; jib and davit; hand hoists, electric hoists, derricks, lifting magnets, and charging machines	6 2/3
Cars—molds, cinder and hot metal ladle, cars charging buggies, transfer cars, ore cars, scale cars, jack cars, skip cars, shop and ash cars, core oven cars	10

Cars—standard gage and narrow gage used by transportation department	10 %
Car transfers, turntables, car dumpers, car shifters, pig-casting machines, water sprays, grab buckets, capstans, windlasses, winches, shear poles, snubbing devices, drag-outs, etc.	8 1/3
Blast furnace stacks, stoves, soaking pits, open hearth, furnaces, crucible melting furnaces, hot metal mixers, converter vessels, cupolas, open hearth pre-heaters, cinder runner, slag spouts, etc.	5
Cupolas, converters, melting furnaces, and accessories	5
Annealing and heating furnaces, ovens, forges, etc.	5
Furnaces	6
Heating and melting furnaces	6
Puddle furnaces, electric, air, oil, and welding furnaces, cooler ovens, drying ovens, etc.	5½
Mill machinery—including roll trains, tables, shears, and intensifiers, cold saws, hotbeds, cooling beds, straightening machines, drag-ons, drag-offs, pushers, ingot buggies, hydraulic accumulators, cold drawn machinery such as draw benches, roll straightening machines, etc., hot saws	5½
Exhaust system	7½
Exhaust blower system	7½
Tanks and reservoirs—steel	4½
Tanks and reservoirs—wood	8
Machinery:	
Machine tools:	
Lathes, slotters, planers, drilling and boring machines; milling machines, tool and surface grinders; emery wheels, keyway cutters, tapping machines, arbor presses, centering machines, squaring machines, hack saws, notching machines, buffing machines, test pumps, pointing machines, metal band saws, belt lacers, saw grinders, etc., die-sinking machines, trimming presses, etc., belt cutters, pipe threading machines, car wheel presses, saw-setting and filing machines, angle-benching machines, cold saw-cutting off machines, etc.	6 2/3
Gun and tool machinery	6
Cartridge machinery	8
Tool and shop machinery	5
Punches, shears, hydraulic and pneumatic riveters; bending rolls, straightening rolls, straightening presses, bulldozers, joggling machines, flanging machines, frame-setting machines, beveling machines, keel-bending machines, can brakes, etc., forging and upsetting machines	6 2/3
Punch presses, bending rolls, power shears, and drop hammers	6 2/3

Hydraulic forging presses, bending presses, and fluid compressers	6 2/3%
Hammers—steam, drop, or helve	10
Shafting, pulleys, hangers, and belting	5
Belting	7
Wood-working machinery—including band, jig, and rip saws, dovetailing machines, moulding machines, tenoners, mortisers, sizers, wood-boring machines, wood shapers, wood lathes, wood planers, universal wood workers, carvers and moulders, sanding machines, surfacers, swing saws, scroll saws, jointers and wood cut-off saws, embossing press, core box, disc grinders	5
Miscellaneous machinery:	
Locomotive cranes, steam and electric, steam shovels	10
Coal and ash handling machinery	8
Hydraulic jacks	10
Conveyors—coal, ash, and sand, screw conveyors	6
Skip and stock hoists	6
Grinding and mixing machines; crushers, pulverizers, squeezers, scrap shears, concrete mixers, mud guns, jarring machines, tumbling barrels, water cinder mills, sand blast machinery, moulding machines, core-ramming machines, roller feeders, etc., testing machines, vibrating machines, tie rod machines, welding machines, etc., magnetic separators, venturimeters, oil meters, fans, gages, blowers, shaving exhaust system, acetylene generators, oil-testing machines, sand dryers, oiling systems, sewing machines, locking machines, crimping machines, classifiers, thickeners, ball mills, roller feeders, revolving screens, flotation machines, belt-strapping machines, mechanical mixing machines, etc.	10
Pickling washing machines, electric and acetylene welding machines	10
Small Tools:	
All small tools of an asset nature	10
Miscellaneous Equipment:	
Miscellaneous shop equipment:	
Anvils, forges, bending blocks, surface plates, mandrels, porter bars, extractors, track and wagon scales, crane scales, portable scales, oil and powder cans, oil filters, glue pots, barrels, microscopes, pyrometers, calorimeters, storage batteries, air hose	10
Pickling tanks, etc.	20
Testing apparatus	10
Testing instruments (electric)	10
Fixed kettles and scales	10

Office and shop furniture and fixtures—including store and tool room fixtures:	
Factory equipment	10%
Furniture and fixtures	10
Partitions	7½
Watchman's system	7½
Benches, partitions—permanent	7½
Benches	8
Trucks and movable racks	7½
Miscellaneous equipment—including desks, chairs, typewriters, adding and calculating machines, blue-printing machines, filing cabinets and trucks, shelving partitions, time clocks, time detector systems, telephone, flexotypes, graphotypes, etc.	10
Typewriters and adding machines	20
Telephone equipment	7½
Transportation—local:	
Locomotives—steam and electric	6 2/3
Motor trucks, automobiles, stable equipment, motor boats, etc.	25
Horses and wagons	12
Laboratory and scientific apparatus	10
Restaurant equipment	10
Surgical instruments	10
Yard equipment—industrial or shop	7½
Floating equipment	10
Patterns—standard:	
Metal, net additions	75
Wood, net additions	100

Basis of Standard Rates

The foregoing schedules are intended as a guide in determining rates of depreciation. All the rates are based on: (1) the cost of equipment, (2) the life of the equipment, and (3) on a ten-hour day; taking into consideration that there will be a residual value after the life. If it is desired to obtain a rate of depreciation covering the whole plant, the rate of 6% may be considered equitable; or the plant may be split up into two sections, viz., (1) buildings and (2) plant, consisting of machinery and equipment. In such a case the rates recommended would be 3% on all buildings, and 7% on machinery and equipment.

Group Rates

If it is desired to adopt rates covering certain groups of plant and equipment, the following schedule is suggested, each group rate to be applied to the investments in that group:

Group Depreciation Rates

	Rates
Buildings:	
Reinforced concrete or steel tile	3%
Brick and steel—non-combustible roof and concrete floors	
Brick, steel, and wood	
Brick and wood	
Steel frame—wooden roof and corrugated iron walls	
Steel frame—non-combustible roof and corrugated iron walls	
All-wood structures—well built (20 years)	
All-wood structures—cheap (20 years)	
Miscellaneous structures	Special
Miscellaneous real estate improvements	"
Mechanical Equipment of Buildings:	
Sprinkler system	6 2/3%
Heating and ventilating system	
Water and sewer piping, and sanitary fixtures	
Electric light and power wiring	
Elevators	
Fire alarm and fire prevention apparatus	
Refrigeration system	
Plant Power and Large Equipments:	
Boilers, pumps, and feed-water heaters, air compressors	6%
Power piping (steam, water, air, gas, and oil)	
Switchboards, main wiring, and conduits	
Turbines, engines, generators, dynamos, transformers	
Cupolas, converters, melting furnaces, and accessories	
Annealing and heating furnaces, ovens, forges, etc.	
Machinery—Exclusive of Hammers:	
Machinery, motors, machine tools, traveling cranes, etc.	6%
Punch presses, bending rolls, power shears	
Wood-working machinery	
Miscellaneous machinery	
Shafting, pulleys, hangers, and belting	
Drop and helve hammers	10%
Small Asset Tools:	
Machine-tool accessories—boring bars, driver's keyseating broaches, etc. (all renewals to repairs)	10%
For machines	
Hand tools	

Punches and dies	Special
Chills, proving ground equipment	
Gages	
Chucks	
Jigs and fixtures	

Rates for Special Machinery

In arranging the foregoing schedule, many items of special machinery are left out of the classification for two reasons: First, before placing a rate on special machinery, the nature of its operation has to be carefully considered; it might, for instance, be used only on certain work. Secondly, obsolescence may be a large factor in determining the rate of a particular machine. In some cases it may be necessary to amortize special machinery when it is of little more than scrap value after a particular piece of work is finished.

Method of Charging off Depreciation

Attention must here be directed to the importance of charging off depreciation on conservative and correct lines. Some manufacturers make a practice of charging off the entire plant as rapidly as possible, while others, in a few years, write off their books from 50% to 75% of the value of their plant assets. Again, in some instances, the amount of depreciation written off depends upon the amount of profit earned for the current year. When a large profit is made, a fair depreciation is written off; whereas, if the profit is small, none whatever is considered.

When the amount of depreciation has been credited to a reserve account and not written off the cost of the plant assets, the only change necessary will be to adjust the amounts of depreciation from the time of the purchase of the property according to the new rates to be used, and then use the proper rates for the ensuing periods. On the other hand, if depreciation has already been written off the asset accounts, adjust-

ments should be made to restore these accounts to their original cost value, and a depreciation reserve account created.

Difference Between Amortization and Depreciation

There is a clear distinction between depreciation and amortization. Depreciation represents the wasting of an asset due to wear and tear and other factors, as mentioned in the beginning of this chapter. Amortization implies that the value of an asset disappears in a given period of time, not through wear and tear, but through obsolescence. Obsolescence may be brought about in various ways. The asset—whether machinery, equipment, or buildings—may become obsolete through the progress of invention; or the value of the asset may disappear through the ownership being vested in other hands after a certain period of time; or the work for which a special type of building or a particular kind of machinery is used may cease entirely. Then, if there is no market for such machinery or buildings, the assets in question will only be worth their scrap value.

Legal Definition of Depreciation and Amortization

A decision of the Treasury Department in the Munitions Tax Law of September 8, 1916, Regulation No. 39, issued October 24, 1916, as Treasury Decision 2384 on Internal Revenue, clearly interprets the difference between depreciation and amortization. As the decision is frequently quoted, and as it is the only published legal decision at present on the distinction between the two, it is herewith reproduced:

> Art. XX. The deduction authorized on account of depreciation relates to the loss due to use, wear and tear of physical property, owned and used by a manufacturer, but which is not specially designed or installed for the purpose of manufacturing munitions or parts thereof, and which, without material alteration and change, may be used in connection with any other business in which the person is or may be hereafter engaged.

The annual deduction on this account will be a reasonable allowance determined upon the basis of the cost and probable number of years constituting the life of the property.

If the same building and machinery or other equipment are used coincidently for purposes other than the manufacture of munitions or parts thereof, then the amount deductible from the gross income returned for the purpose of this Title on account of depreciation will be apportioned in accordance with the rule hereinbefore set out for apportioning running expenses, and the deduction from the gross income contemplated by this Title will be made accordingly.

Art. XXI. Section 302 of this Title authorizes a deduction to meet the conditions peculiar to each concern, and has for its purpose the amortization of the values of buildings and machinery constituting special plants, which will, except for salvage, have no substantial value to the manufacturer when the contracts executed or to be executed for the manufacturer of munitions or parts thereof, have been fully performed.

The deduction authorized on this account relates to property (buildings, machinery and equipment) especially constructed or installed for use in the manufacture of munitions or parts thereof, and which, when no longer useful for this purpose, cannot, without material alteration or change, if at all, be used for any other purpose, the life of which property is substantially coincident with the life of the contracts.

The annual allowance to be deducted on this account will be determined by estimating the probable number of years the property will be used in the manufacture of munitions or parts, and by dividing the cost of such property, less estimated salvage, by such probable number of years. The quotient thus obtained will measure the amount to be deducted each year on account of amortization, until the cost of the property has been extinguished. Or the cost of the property may be amortized on the basis of the quantity of munitions or parts thereof manufactured under contracts in connection with the fulfilment of which the buildings and machinery or equipment were specially constructed or installed.

Neither the depreciation nor the amortization deduction allowable in the return made for the purpose of this Title will relate to property used in connection with any other business carried on by the manufacturer. Amortization applies only and particularly to those special plants and equipment whose life and value, except salvage, will terminate with the end of the business for which they were

erected and equipped. It is to be differentiated from depreciation in that depreciation relates to property whose life and value is not dependent upon or materially affected by its use in the manufacture of munitions or parts thereof.

The Effect of Overtime on Depreciation

The following is a copy of a letter sent to the author by the auditor of one of America's largest steel companies on the question of abnormal depreciation caused by working overtime. The letter in question covers the problems raised by working overtime under war conditions and on war contracts, but as the writer clearly states the proposition as a whole, and the points raised therein are important, the letter is here reproduced in full:

1. In arriving at rates for overtime depreciation, due consideration should be given to the following conditions, the effect of which should be properly reflected in any rates established:

(a) Any time over the normal should be subject to overtime deprecation.

(b) Present conditions demand that production be considered paramount. The machine receives secondary consideration. In fact it is forgotten and is usually "driven to death."

(c) The constant usage of a machine affords no opportunity for proper repairs and supervision of its condition and maintenance, all of which obviously shortens its life.

(d) When there is more than one shift the responsibility for the up-keep is divided, as each man, especially if on piece-work, will always leave it to the following man to "fix things up," with the result that the machine is bound to suffer.

(e) Extra shifts necessitate having at least two, in many cases three men, working on the same machine in the course of 24 hours. Inasmuch as no two men will run a machine in the same manner the effect must be detrimental.

(f) Working over eight hours will necessitate night work. The reduced efficiency of a man on night work has been recognized and is bound to be reflected in the usage of the machine.

(g) Additional shifts require a larger supply of men, and accordingly dilute skilled labor so that it

becomes necessary to take on green men—which fact does not presage any good for the machine.

(h) When driving a machine incessantly it has no chance to rest. It is scientifically conceded that metal is subject to fatigue and its life is lengthened by an occasional rest.

2. We feel that the rates established for normal depreciation should be on the basis of an eight-hour day. Any department working in excess of eight hours should be subject to overtime depreciation. Inasmuch as all plants engaged on Government work consider that a straight day's work or shift is eight hours, we think it would be a mistake as well as cause considerable confusion to make any further distinction.

3. (a) The following is a table of rates which we think would fairly reflect the proper allowances for abnormal depreciation:

8	hours—normal depreciation				
9	"	— 5%	of normal depreciation, additional		
10	"	— 10%	"	"	"
11	"	— 15%	"	"	"
12	"	— 20%	"	"	"
13	"	— 25%	"	"	"
14	"	— 30%	"	"	"
15	"	— 40%	"	"	"
16	"	— 50%	"	"	"
17	"	— 60%	"	"	"
18	"	— 70%	"	"	"
19	"	— 80%	"	"	"
20	"	— 90%	"	"	"
21	"	—100%	"	"	"
22	"	—115%	"	"	"
23	"	—130%	"	"	"
24	"	—150%	"	"	"

(b) We feel that in fairness to all, after a normal rate of depreciation has been established, the allowance for overtime depreciation should exclude the element of obsolescence. This would mean that the allowance for overtime depreciation *up to a certain point* would not increase in the same ratio as the number of hours. In other words, we consider that the factor of obsolescence would be constant, and the only varying element would be the actual depreciation due to wear and tear. The "certain point" referred to above should be sixteen hours. After this point, we consider depreciation takes place very rapidly and we feel that in the above table the conditions are truly presented.

4. We think, furthermore, that it would be an injustice

not to consider that the auxiliary departments of a plant should be subject to overtime depreciation. By this is meant such departments as steam, power, water, transportation, etc. Obviously a "speed-up" program is felt in every department in the plant. It is conceded that these departments do ordinarily work 24 hours a day, but it is only in a measure. Under normal conditions they are working at full capacity only a fractional part of a day, and it was on this basis that normal depreciation was figured. If, however, it is required that these plants be run at full capacity for a greater than their normal time, it cannot be denied that there is additional depreciation.

5. We feel that the application of overtime depreciation will necessitate the determination of normal depreciation for each department in the plant. Furthermore, the determination of the number of hours a department is working overtime, unless treated in a broad way, might resolve itself into a complicated problem. Not knowing the attitude that will be taken in this respect, we hesitate in offering any suggestions.

6. We trust that if not considered out of order, you will forward this statement of our views to the War Appraisals Board. This question is of much importance to us and we are accordingly deeply interested. We would be glad to furnish the Board with any information that it might require and would be very glad to work with it further, giving it any possible benefit resulting from our detail study and experience.

Limit of Maximum Percentage for Overtime

There is one exception that the author would like to make in connection with the schedule presented on page 157. Before outlining this exception, a quotation bearing on the same subject is taken from a memorandum of Captain J. P. Carlin, Washington, D. C., who has made a very exhaustive study of the subject of depreciation and the effect of overtime. The memorandum in part reads as follows:

1. It is assumed that every manufacturer will have a machine reserve supply to prevent unnecessary destruction of plant.
2. If a reserve supply is maintained, proper relaxation will be given the machinery and opportunity afforded for proper repairs and maintenance.

3. Proper supervision will result in the machinery repair and maintenance group, maintaining each unit of the plant in proper shape, irrespective of shifts.
4. Normal rates of depreciation are considered on the basis of normal labor conditions and the average workman is this basis.
5. Night work results in decreased efficiency, but should show no appreciable reflection in the usage of the machines, especially where maintenance is kept up by day repair crews.
6. Where skilled labor is diluted with unskilled labor, it is considered that depreciation resulting from wear and tear will be increased; but this will be absorbed in maintenance charges, which are allowed as an element of cost in cost-plus contracts in addition to depreciation.

The only variable in overtime use or diluted labor is wear and tear. Natural decay and obsolescence, however, were also considered in determining the normal rates of depreciation. Both deterioration and obsolescence are constant and proper maintenance should absorb a part of the wear and tear.

Theoretically, however, it is evident that if age deterioration and obsolescence, two of the three elements of depreciation, are constant, and if the third physical deterioration due to wear and tear is partially made good by maintenance . . . *the total allowance for overtime or other causes should not exceed* 100% *additional of the normal rate.*

The author has also come to the conclusion, after careful consideration, that the rate at no time should exceed an additional 100% of the normal rate. With normal rates calculated on a ten-hour basis, it is recommended that the additional percentages as outlined in schedule of depreciation rates to cover the additional hours, should be as follows:

11 hrs.—	add	5%	of the	normal	rate	
12 " —	"	10	" "	"	"	
13 " —	"	15	" "	"	"	
14 " —	"	20	" "	"	"	
15 " —	"	25	" "	"	"	
16 " —	"	30	" "	"	"	
17 " —	"	35	" "	"	"	
18 " —	"	40	" "	"	"	

19 hrs.—	add	45%	of the	normal	rate	
20 " —	"	50	"	"	"	"
21 " —	"	57½	"	"	"	"
22 " —	"	67½	"	"	"	"
23 " —	"	80	"	"	"	"
24 " —	"	95	"	"	"	"

In discussing the additional percentages for overtime, the fact must also be taken into consideration that proper maintenance and repairs are essential for machine operation; otherwise machinery would break down and production would be interfered with. No manufacturer would consider for a moment running his machinery continuously without repairing or adjusting it. In other words, if no time is provided for repairs and maintenance, the machine has to be laid aside and another substituted. Depreciation would then cease at that point, excepting for the small rate of an idle machine. Another fact which should be considered is that repairs and maintenance are chargeable as costs, and, if not made during the current period, must be made later. This cost would offset any higher percentages to add to the normal depreciation rate.

Abnormal Depreciation and Amortization

Wherever plant and facilities have been acquired specifically for certain contracts and depreciate in value owing to the market conditions, an allowance should be made for the difference between the actual cost and the market value, providing the market value is much lower than the cost. This difference or loss in invested capital should be borne by the contracts.

Another problem sometimes arises which must be taken care of by amortization. This occurs where the contractor has purchased special machinery and equipment to be used exclusively on certain contracts, and where the value of this machinery and equipment may be worth little more than scrap value at the end of the contract owing to the fact that they

cannot be used for any other purpose. Wherever a condition of this kind exists, the following information should be obtained and used as a basis for determining the method of amortization:

1. Cost of the equipment.
2. Can the equipment be used for any other purpose than for the contract for which it was purchased; if so, for what class of product can such equipment be used, stating particularly whether or not the product is one which is being manufactured in the particular plant or elsewhere.
3. In the estimated value of the equipment at the end of the contracts in question, the basis of the valuation of the machinery or equipment should be stated in connection with that outlined under (2).
4. If the machinery or equipment is of such character that it cannot be used in connection with any other work, the value should be appraised accordingly.
5. The scrap value of the machinery and equipment independent of all differences should also be stated.

Before final action is taken to amortize machinery and equipment as in the outline above, it would be advisable to have a qualified engineer report on the matter in question.

Maintenance, Repairs, and Renewals

The cost of maintenance, including repairs and renewals, is often charged against the reserve for depreciation, for the reason that depreciation rates are established after taking into consideration the estimated cost of maintenance during a given period of time. Wherever the cost of maintenance is charged as a separate item of overhead, provision should be made for its distribution over departments. If the cost of each individual repair and renewal order is compiled separately, the

charge may be applied directly to the department in which the repair is made. In large manufacturing plants this may be readily done.

The cost of maintenance comprises two classes of repairs and renewals:

1. Repairs which are a daily occurrence and practically in the nature of up-keep. Such items refer to the repair of belts, doors, and miscellaneous equipment, and small tools.
2. Repairs or renewals which are more or less extraordinary in character, such as those where the volume of work is so large as to make it more equitable to distribute the total cost over a longer period of time than one month.

CHAPTER XI

DISTRIBUTION OF FACTORY OVERHEAD

Direct and Indirect Distribution of Overhead

We have seen that the elements of prime cost, which include material and labor, are applied directly to the product. Any factory expenses which can be treated as a direct expense charge are applied in the same way, and when this is done they are taken out of the class of factory overhead. If it were possible to assign all items composing the factory overhead expenses directly to the product manufactured, true costs would be obtained very easily; but this can seldom be done. It is best, however, to assign as many of the indirect charges as possible directly to the product to which they relate, thus tending to reduce to a minimum the total amount of factory overhead to be applied indirectly.

The factory overhead that cannot be absorbed in the article cost directly is applied indirectly in the following manner:

1. The elements of factory overhead cost are assigned equitably to specific departments of the factory, including productive, non-productive, and miscellaneous departments.
2. The total cost of the indirect departments is then transferred to, and distributed over, the productive departments on some fair basis.
3. The total amount of factory overhead expenses chargeable to each productive department is determined, and is then distributed over the various jobs, orders, articles, or processes.

Each item of overhead is not necessarily applicable to all departments of the plant; or where it is, it will not be applicable to each in the same proportion. Some of the items relate particularly to one department, whereas others relate to two or more.

The only equitable way of ascertaining true costs in a large factory, is by computing separate departmental rates for the overhead affecting the commodities which pass through each department. In smaller plants, and under some conditions, the product manufactured may be of such a character that one overhead rate is applicable to the entire production of the plant. Examples of this kind are rare, however, and in adopting a plan for distributing factory overhead expenses, care should be exercised to ascertain the departmental overhead in the correct way at the start.

General Operating Expenses

In large manufacturing plants it is impossible to charge all items of factory overhead to definite departments. After all expenses which can be so applied are charged to the departments in which they originate or to which they obviously belong, there are some which relate to the plant as a whole. These items are often summarized under the caption "General Operating Expenses." After their total is ascertained, it is distributed over all the departments of the plant on some arbitrary basis. In this way the general operating expenses are included in the departmental overhead rates which are ascertained after the total overhead of each of the non-productive departments has been distributed to the productive departments.

Under some conditions it is practicable to treat the general operating expenses as a separate item of cost, in which case a separate rate is provided for absorbing this fourth element of factory cost in the cost of the articles manufac-

tured. In other cases the general operating expenses are absorbed in the article cost by the addition of a certain percentage to the departmental overhead rates. Whether they should be applied to the product as a separate item of cost, or as part of the overhead of departments, must be determined by the circumstances of the case.

Methods of Distributing Overhead

Assuming the departmental method of distributing overhead has been adopted, there still remains the most complex problem of all—upon what basis shall the overhead be distributed within the departments so that each job, order, or article may be charged with the portion that properly belongs to it? To illustrate, it may be assumed that high-priced and low-priced men work side by side, or that there are machines of different size and value operated by men who draw the same wages, or that the operations involve about equal parts of machine work and work by hand—all of which are quite ordinary conditions. Shall the basis for the distribution of the departmental overhead be the cost of the labor expended upon the work, or the time given to it in the department? Does the cost of material enter in as a factor? Is a machine rate possible or practical? These are some of the questions which must be answered, and answered correctly, if the cost results are to be accurate. Thus, no one method of distributing indirect expense can be applicable to all cases; everything depends on the particular conditions.

It is not the intention here to attempt to describe in detail every method that may be employed, but only those which are commonly used at the present time and which, as more or less standard methods, may be satisfactorily applied under definite conditions of manufacture. These are:

1. Prime-cost method
2. Productive-labor-cost method

3. Productive-labor-hours method
4. Machine-rate methods
5. Miscellaneous methods

The above methods of distribution may be further classified under the three broad divisions described below:

1. Material and labor methods, in which the combined material and labor costs furnish the basis for the distribution of expense.
2. Labor methods, in which the labor cost or the labor hour furnishes the basis for the distribution of expense.
3. Machine methods in which the operating time of the various machines furnishes the basis for distributing the items of expense.

1. Prime-Cost Method

Under simple conditions the method most generally used by small manufacturing concerns for charging departmental overhead to the product is the prime-cost method. Of all methods it is the most simple, and its presence is discernible even under conditions where no cost systems are in operation. In most businesses, for example, where a complete cost system is not operated, an attempt is made to ascertain costs when fixing selling prices by carefully calculating the material and labor costs; but as regards the overhead, complete records are not available to determine what percentage should be added to the material and labor costs to cover all items of expense. All too frequently in this percentage, selling and administrative expenses are combined with factory overhead items. This rough and ready method of lumping all expense items together is inaccurate for the reason that if inventory values are based upon costs which include selling and administrative expenses, these values will be inflated.

Calculation of Prime-Cost Rate

To obtain the proper percentage to be used in applying the prime-cost method, it is necessary to divide the total overhead expenses by the total material and labor costs, the result being a decimal figure which is the rate to be used. Reduced to a formula, the procedure is as follows:

$$\frac{\text{Overhead costs}}{\text{Material cost} + \text{labor cost}} = \text{Percentage to be added to the total material and labor costs to cover the overhead expenses.}$$

For example, if during a definite period the amount expended for all direct material is $20,000, and for direct labor is $30,000, and overhead expenses for the same period are $25,000, the percentage to be used in distributing overhead costs over the product or article would be ascertained as follows:

$$\frac{\text{Overhead cost } \$25{,}000}{\text{Material cost } \$20{,}000 + \text{labor cost } \$30{,}000} = 50\% \text{ to be added to the prime cost to cover the overhead on the article.}$$

Thus, if the material cost of an article is $10, its direct labor cost is $5, and the overhead rate is found to be 50% of the prime cost, the total production cost would then be stated as follows:

Material cost	$10.00
Labor cost	5.00
Overhead cost (50% of $15)	7.50
Total cost	$22.50

The correct application of the prime-cost method depends upon the accuracy of the percentage rate established. This rate is usually based upon past experience as ascertained from the financial statements covering prior periods. Often, however, the percentage is fixed by business custom and largely depends upon what manufacturers in the same line of business are using as a basis for arriving at their selling prices.

Advantages and Disadvantage

The chief arguments in favor of the prime-cost method of distributing overhead are the simplicity of the plan and the few records required. Its disadvantage is that as indirect expenses are not applied to each class of merchandise manufactured in the same proportion for each departmental process or for different methods of manufacture, the use of this method often results in inaccurate article costs. The fault is very marked when certain articles pass through only a few departmental processes, while others undergo all or nearly all processes of manufacture. Under these conditions, some articles may be burdened with a share of the overhead expenses of one or more departments through which they do not pass.

Attempts have been made to overcome the foregoing defect of the prime-cost method of distributing overhead by establishing a percentage rate for each department; but this leads to difficulties, for the reason that material does not form part of the cost in every department through which the article passes. The costs in those departments where no material is used consist only of labor and overhead, and therefore no prime-cost method could be established.

Manufacturers may be led into fatal errors by placing too great reliance upon costs which are inaccurately obtained. Percentage plans of this character do not provide for a comprehensive analysis of costs, and too often the true value of a more accurate method of expense distribution is relinquished for the sake of simplicity. It should be noted that every department of a plant usually has its own special equipment and may differ from other departments greatly in its capital investment, the labor it employs, the floor space occupied, the power consumed, and in numerous other details. Therefore, any method of overhead distribution which fails to recognize and analyze these inequalities, fails to utilize the natural centers and the most efficient basis for overhead distribution.

Conditions under which Inapplicable

Under the prime-cost method of expense distribution, the cost of material is recognized as one of the factors that give rise to indirect expenses. If the method is used out of its special field, where the necessary uniform conditions do not exist and where the material cost varies considerably from the labor cost, the results are quite unreliable.

An illustration will bring out forcibly the reason for the inaccuracy. Assume that in a jewelry establishment two gold rings are made in practically the same manner, without stones in the settings, and that the cost of material (gold) amounts to $5 for each ring. In one ring a diamond costing $50 is then mounted, which makes the material cost of that ring $55. In the other ring a diamond is set worth $200, making the material cost $205. As the labor cost is the same in both cases, to the more expensive ring would be added about four times as much overhead as to the cheaper ring; yet logically no more overhead should be added to one ring than to the other. If any additional element of overhead were added to the more expensive ring, it should be only for such items as insurance, interest, and other special charges incurred in handling the more costly setting. The more accurate method in this case would be to base the overhead cost of the rings upon the cost of the labor, or hours of labor, spent in producing them—methods of distribution to be explained in following sections.

2. Productive-Labor-Cost Method

The productive-labor-cost method is based upon the principle that indirect expenses are incurred in proportion to the cost of the labor involved. To operate the plan, the total amount of overhead expenses for a definite period is divided by the total cost of the direct labor for the same period. This shows the proportion of the overhead expenses to the total

productive labor in terms of percentage. The amount of overhead to be assigned to any article is then found by multiplying the direct labor cost by the percentage, the result being the amount of the indirect expenses to be added to the prime cost in order to give the total factory cost. The same principle applies to the cost of any job, order, article, or process. This method may be concretely presented by means of the following formula:

$$\frac{\text{Total factory overhead}}{\text{Total productive labor cost}} = \text{Percentage of productive labor cost to be charged to job, order, article or process.}$$

To illustrate, assume that the pay-rolls for a certain period show payments of $16,000 for direct labor, and that the factory overhead expenses for the same period are $14,000, or 87½% of the direct labor cost. If a man works on an article five hours at 32 cents an hour, and the cost of the direct material is 60 cents, the total production cost of the article may be stated as follows:

Direct material cost	$ .60
Direct labor cost	1.60
Factory overhead cost (87½% of $1.60)	1.40
Total cost	$3.60

Applicability of Labor-Cost Method

The simplicity of the labor-cost method is a great point in its favor, but at the same time offers a temptation to employ it too widely. The point to consider is how far the particular conditions are in accord with the principle of the method. To fit the case perfectly, the labor should be the dominant element in the manufacturing process, and there should be a marked uniformity as to product, wages paid, and time of operation on the articles manufactured. These conditions rarely exist throughout an entire factory, but are not uncommon in a single department. If applied to a department under

the conditions stated, the method will prove to be quite accurate.

When the productive-labor-cost method is used in departments equipped with machines, special care must be exercised to see that these departments are uniform as to cost and operating expenses; or, if not, that there is a corresponding difference between the wages paid to the operators. The method is less accurate, and even misleading, if these uniformities do not exist. For instance, if a low-priced man is operating an expensive automatic machine, and a high-priced man is working at a cheap machine where skill amounts to more than the cost of operating the machine, the charges for indirect expense will not only be inaccurate but will be actually reversed.

The productive-labor-cost method is often used to prorate unassigned items of factory overhead to the operating departments of the plant when the data upon which to base a more intelligent distribution cannot be readily obtained. Any errors which might result from the distribution of the unassigned expenses in this way would be very slight in most instances, as they would be absorbed in the cost of the entire production of all departments. However, only an examination of the peculiar circumstances of each case can determine where theoretical accuracy may be safely sacrificed for simplicity and practical results.

3. Productive-Labor-Hours Method

The principle of the productive-labor-hours method differs from that just described only in that the amount of labor is measured by time and not by cost. That is to say, the overhead expenses of a plant are considered to be in proportion to the number of employees engaged and the hours they work, rather than to the wages paid. To operate the plan, the total amount of factory overhead expense for some definite period is divided by the total number of productive hours of work

during the same period, the result being the rate per hour to be added as overhead cost to the prime cost of the product. Reduced to a formula, the principle may be stated as follows:

$$\frac{\text{Total amount of factory overhead expense}}{\text{Total number of productive labor hours}} = \text{Rate per hour to be applied to the number of hours of work upon the product.}$$

Using this formula, and assuming the number of working hours of direct labor to be 56,000 and the factory expense $14,000, the result would be:

$$\frac{\$14{,}000 \text{ factory expense}}{56{,}000 \text{ hours}} = \text{25 cents per hour to be charged to job, order, or process for each productive hour of work spent upon it.}$$

The total cost of the single article discussed under the preceding method would then be:

Direct material cost	$ .60
Direct labor cost (5 hours at 32 cents per hour)	1.60
Factory overhead cost (5 hours at 25 cents per hour)	1.25
Total cost	$3.45

An analysis of the difference between the two costs will provide the best basis of comparison between the methods. The critical point is the 32 cents per hour of the labor cost. In the first example the average wage per hour, found by dividing $16,000 by 56,000, is only 28 4/7 cents. Therefore, the output of any man whose pay is more than 28 4/7 cents per hour has to bear more of the indirect expense in the first method than in the second.

This makes it clear why there should be a marked uniformity as to product, wages, and time of operation in the direct-labor-cost method. Differences in any of these factors tend to indicate marked discrepancies in costs unless it can be shown that there are corresponding differences in the di-

rect elements of cost. This has to be shown in each particular case; for there is no essential reason why, as between two men working side by side, the output of the higher-priced man should incur more overhead costs than the other. On consideration it will be evident that, on the whole, factory overhead expense is more a function of time than of labor cost. If the items that make up the factory overhead are examined one by one, as indirect labor items, rent, insurance, taxes, interest, depreciation, maintenance, repairs, renewals, light, heat, power, etc., it will be seen at once that the majority, though not all of them, accumulate according to time and have but a very slight connection with the rate of wages.

The conclusion is clear that, other conditions being equal, the productive-labor-hours method is applicable to a wider field than the productive-labor-cost method. Certain limitations remain, viz., the labor should be a dominant factor, and for the most part the product should be uniform. Where machines are used, the same precautions must be taken as in the case of the previous method except that the wages of the operators may be disregarded.

4. (a) Machine-Rate Methods

All machine-rate methods are based upon the principle that overhead expense accrues in proportion to the number of hours of machine operation. The modern application of the machine-rate principle covers two important points which are as follows:

1. It recognizes and provides for differences in overhead expense that arise from the operation of different kinds of machines.
2. It is specifically devised to absorb, as direct charges, all overhead expense that can be associated directly or indirectly with the operation of any machine or particular area of the plant.

In installing the machine-rate method, the department is taken as the unit whenever possible; but if a department includes different machines or processes, a further subdivision of the departmental charges must be made. The essential point is to reduce the unit to processes of the same kind, or to the machines used in such processes, even if this carries it down to the single machine.

The object in view is to collect the direct labor cost and overhead expense against each machine or process in such a way as to ascertain what it actually costs to operate the machine per hour, i.e., what the hourly machine rate is when the operations or processes have been classified and the charges have been made, each item being considered by itself. In obtaining the charge per hour, which includes the direct labor cost as well as the overhead cost, only the actual number of operating hours for the cost period is taken into consideration.

There are various forms of machine-rate methods, termed "old-machine-rate," "new-machine-rate," "fixed-machine-rate," "scientific-machine-rate," and "supplementary-machine-rate." They can all be specifically commended where machines are largely used, for the reason that all items of overhead expense are gathered at the "point of the tool," so to speak, where they are easily applied to the product. The method in all cases is to utilize a machine or group of like machines—termed production centers—for distributing overhead expenses.

Wherever the machinery is of more importance than the human element and the workman is merely a tender or the tool of the machine, the machine-rate plan will be the most equitable method of distributing overhead expense. On the other hand, if the skill of the workman is required to make the product, and the machine is of secondary importance, i.e., a tool used in the production, either the productive-labor-cost method or productive-hour method is more accurate.

Method of Compiling Machine Rate

In ascertaining the machine rate, the direct labor cost is obtained from labor reports, as is also the number of operating hours. The material cost may also be combined with the direct labor and overhead cost before the machine rate is fixed, if the materials operated on are the same in grade or price. If price or grade varies, the material cost should not be so included. Expenses which are more or less fixed in character, such as rent, insurance, taxes, interest, and depreciation, accumulate and are chargeable to a machine whether it is operated or not. These charges are usually applied upon the basis of floor space or valuation of the equipment.

Depreciation is charged to each machine at a rate per hour ascertained by dividing the total cost of the machine, less its scrap value, by the estimated number of working hours of its life. In some cases, where machines stand idle for a considerable length of time, charges applicable to them are distributed over an entire operating department instead of apportioning them among the idle machines. In this way these expenses are distributed and absorbed in the cost of all product which goes through the operating department.

The power cost chargeable to a particular machine should be based on consumption. An allowance for horse-power lost in transmission may be made if great exactness is required. If no such allowance is called for, the first step in determining power charges is to calculate the horse-power hours of all machines operated. This is done by multiplying the horse-power of each machine by the number of hours it is operated and adding the individual totals. Any power generated at the engine but not indicated in the above total, is simply considered as unutilized power, the cost of which is borne pro rata by all the machines.

After all the charges have been made directly to the various machines, the balance of the indirect expenses which can-

not be directly connected with machine operation must be considered. These are of two classes—expenses that can be identified with certain departments, and general operating expenses for the plant as a whole. Each department adds to its own departmental indirect expense its share of the general operating expense, and proceeds to distribute the total over its own product in accordance with the plan of expense distribution which seems best to fit the needs of the case. For example, if the departmental costs are based on a unit of measure, as a ton or gallon, a score or dozen, the total indirect expense of the department is divided by the total units of output, giving the rate per unit. The rate so obtained is used to charge the machines or processes with their proportion of overhead, by multiplying the number of units of product operated on in either case, by the rate per unit.

If the costs are based on time, the departmental expense is divided by the total number of machine-operating hours. This rate is added to the direct rate already established, giving the complete or final rate per hour to be charged to the product of that department. After all indirect and general operating expenses have been applied to a machine, the formula for ascertaining the machine rate would be as follows:

$$\frac{\text{Total amount of productive labor} + \text{total amount of overhead applicable to a machine}}{\text{Total number of machine-operating hours}} = \text{Machine rate to be applied to product for each hour of machine operation.}$$

Assuming that an article passes through several machine processes, its overhead cost is arrived at by multiplying the hours of each process and adding together the separate totals thus obtained. Material costs must then be added to the process cost to give the final factory cost.

The scope of the machine-rate method is covered by the

foregoing descriptions. It can be used when all operations are performed by machines, but it cannot be applied to general bench-work and miscellaneous forms of hand labor.

4. (b) Fixed Machine-Rate Method

The fixed machine rate is characterized by three special features:

1. The rate itself is an estimate and is made in advance.
2. The rate is estimated on the basis that every machine in the shop will run full time.
3. All charges unabsorbed by the estimated fixed rate are distributed through a supplementary rate, the special feature of which is its relation to idle time.

Without going into a detailed explanation, it may be well to state that this fixed method is neither an accurate nor a practical method of distributing overhead for several reasons: first, the rate is an estimate and not a fact; second, it is based on every machine in a shop running full time, which is rarely the case; and third, the adjustment to actual conditions is made by means of a supplementary rate, which destroys the accuracy of the overhead distribution to product.

The only commendable feature in connection with this rate is the fact that it provides a record of idle machine time. While this is very valuable data, it could be compiled in a supplementary statistical record without the necessity of using it as a method of overhead distribution.

4. (c) Sold-Hour Method

A simplification of the machine-rate plan is that known as the "sold-hour" method. The principle on which it is based is that the services of a particular department (usually one in which the machine equipment is not very elaborate) are "sold" for so much an hour regardless of the type of machinery or

grade of labor employed. The hourly rate is determined by combining the departmental overhead with its total wages, and dividing the sum thus obtained by the number of hours of work spent on jobs within a given period—taking the average figures of a normal period. As an example, if wages plus overhead average $5,000, and 5,000 productive hours cover the work of a cost period, the charge to jobs would be $1 for each hour's work spent upon them.

The ease with which costs can be computed by this simple method makes its use applicable where other methods would prove cumbersome or superfluous in their greater detail. It is especially appropriate to conditions where the work partakes of the nature of a service rendered. For this reason the method is generally applied to the composing departments of printeries, and to departments where experimental or similar work is carried on. In both these instances jobs are handled strictly in conformity with the wishes of the customer, and an average charge for the hourly services of the department is a truer index of cost than would be a charge made in any other way.

5. Miscellaneous Methods

Various modifications and combinations of methods for the distribution of overhead have been devised to meet special conditions in different lines of business. For the most part they are "percentage" plans in some form or other. It has been shown that accurate costs cannot be obtained by the addition of an arbitrary percentage to the prime cost of the product, except under the most elementary conditions where there is only one class of product and all processes are the same. This, however, does not forbid the application of a percentage to the output of a particular department for the distribution of departmental expenses. In fact, the productive-labor-cost method is a percentage plan, but is not an arbitrary percentage

plan, since it is based on one of the important factors of production.

The manufacturing conditions under which an arbitrary percentage may be safely used for the distribution of expense must be judged by direct observation. Wherever employed, the percentage method usually fails to distribute the overhead as accurately as the other methods described.

In shops where the material constitutes much the larger part of the prime cost and where the processes are uniform, overhead may be distributed upon the basis of weight, quantity, or number—as so much per ton, dozen, gross, hundred, and so on.

Under conditions where the material does not differ in grade or price to any considerable degree, or where the work is little more than that of assembling finished parts bought in the market, the cost of the material may be substituted for the quantity as the unit of distribution. However, such conditions are only found in a small business, or in a special department of a large business.

Overhead may also be distributed over departments according to the number of employees in each. This method is advocated for distributing the cost of police protection as outlined in Chapter XXXII in the section on "Guarding of Property."

Fixed Versus Fluctuating Rates

After the particular method for the distribution of overhead has been decided upon and the rates determined, the question arises as to the length of time the rates shall be adhered to. Output in most plants fluctuates from month to month, and most factories experience dull seasons which are offset by exceptionally busy periods. Therefore, the question arises as to the better plan to pursue. Should a fixed rate be established to be used throughout an entire fiscal period or

should the rate be changed at the end of each cost period?

When the product is subject to seasonal demands, it is advisable to adhere to a fixed or predetermined rate based upon past experience until the cost data show that it is unreliable. At no time should a fixed and arbitrary rate be used for a definite period if it does not insure accurate costs.

In establishing a fixed rate for a future period, the figures should be based on those of past experience. In some cases the rates are based on the average figures of three to five years. This practice leads to errors, as it is rarely necessary to take more than one year's transactions as a basis for establishing an overhead rate. The averaging of a long period too often covers up details which would be apparent if one particular year's figures only were analyzed and used. In small plants the figures for six, three, or even one month may be adequate.

After the rates based on past experience are compiled, they should be carefully checked. Questions as to future changes in policy should then be considered. Increases in overhead are bound to occur in every progressive factory, and the rates should be brought as nearly up to date as possible so as to include increases which may occur in the immediate future. After the results for both past and future periods have been properly considered, a fixed rate may be established until such time as it proves to be inaccurate. When overhead rates are fixed at the beginning of the period, the routine work of cost accounting is simplified. It is not necessary to wait and hold up valuable cost data until the current rate is compiled.

When fluctuating rates are used, they must necessarily be ascertained at the end of the month or the cost period. This necessitates postponing the compilation of complete costs until all items of indirect expense are recorded and the overhead rate is ascertained, which is after the books have been

closed. To avoid this delay, the rate of the previous month may be used, and changed only if the current month's transactions indicate that this is necessary. If the rates are based on the figures of the current month, valuable cost information may not be furnished promptly to the management because the cost department must wait until the end of the month before preparing the statistics. Therefore, whenever possible, fixed overhead rates with complete accounting records for proving their accuracy are to be preferred.

Adjustment of Factory Overhead

After it has been determined whether or not it is more practicable to use fixed or fluctuating percentages or rates, conditions may change and thus upset all previous overhead calculations. At such times adjustments are necessary.

For instance, when an accounting is made at the end of a cost period it may be found that some of the overhead still remains to be absorbed, or that the percentages and rates are too high and therefore the factory overhead has been what is termed "over-applied"; in either case the records should be adjusted to show true costs. If it is discovered that the overhead rates have not been properly established, new rates should be prepared immediately and put into use as soon as practicable after errors of principle have been disclosed.

In some businesses the selling prices for different lines, or for the entire product, are established in advance of production and are based on predetermined or estimated costs. In such a case, if costs are underestimated and it is impossible to correct the selling prices after they are once determined, the manufacturer suffers a loss on orders taken in advance and priced upon overhead rates which do not cover the costs. This frequently happens when orders are accepted for future delivery. Selling prices of merchandise cannot then be changed until new orders are taken or a new season begins.

Again, abnormal trade conditions sometimes cause orders to fall off, with a consequent decrease in production. Under these conditions, the overhead percentages or rates normally used are inadequate to apportion the total factory overhead over the decreased number of orders received when the plant cannot be kept operating full time. The question then arises as to whether or not to change the overhead percentages and thereby increase the cost, which would necessitate raising the prices of the merchandise manufactured. If these abnormal conditions are temporary in character, a raise in prices may cause a still further decrease in the amount of orders received, whereas an increase in business is necessary. All these are points to be carefully considered when a change in the rates is contemplated.

When the class of trade does not permit the absorption of abnormal overhead in the article cost, normal rates should be used as a basis for selling prices. The adjustments then necessary to cover the unabsorbed expense should be charged directly to the Profit and Loss account and should not be included in the overhead.

When it is discovered that the rates are too low and that for several months overhead has been under-absorbed, it may be found impossible to absorb the unapplied overhead in the article cost. Under these circumstances any adjustments in the overhead accounts must be charged to the Profit and Loss account. No provision can be made for increasing the value of the merchandise on hand, for the reason that there is no basis for apportioning the unapplied overhead to the cost of the articles sold and to the cost of those on hand.

In like manner, when factory overhead is overapplied and adjustments need to be made, the price of the articles already shipped or sold cannot obviously be changed, while those in stock may be valued at too high an amount, and this may lead to the rendering of a false statement of financial

FACTORY OVERHEAD	Ascertaining the Factory Overhead	1. Indirect Material 2. Indirect Labor 3. Fixed Charges 4. Repairs and Renewals 5. Power, Light, and Heat 6. Freight and Cartage Inward 7. Over, Short, and Damage
	Distribution to Departments	1. Ascertaining Productive Department Overhead 2. Ascertaining Non-Productive Department Overhead 3. Ascertaining Miscellaneous Department Overhead 4. Ascertaining General Operating Overhead 5. Distributing General Operating Overhead to Productive, Non-Productive, and Miscellaneous Departments 6. Distributing Non-Productive Department Overhead to Productive Departments
	Distribution to Jobs or Processes	1. Directly to Job, Order, or Article 2. Directly to Process 3. Process Overhead to Jobs, Orders, or Articles
	Methods of Overhead Distribution	1. Prime Cost 2. Productive Labor Cost 3. Productive Labor Hours 4. Machine Methods 5. Miscellaneous Methods
	Application of Overhead Rates and Percentages	1. Fixed 2. Fluctuating
	Adjustment of Overhead Rates and Percentages	

Form 31. Classification Chart of Factory Overhead

condition. Whenever it is discovered that finished stock has been valued at too high a cost, some provision must be made for writing down this overvaluation to a proper cost basis.

To sum up, the careful computation of accurate overhead rates is one of the most difficult and important matters in the operation of every cost system. The figures should represent true costs, and to achieve this end the calculations should be checked at the end of each cost period and any discrepancies corrected promptly. Only in this way can the inventory valuations be accepted as reliable.

Summary of Factory Overhead

The items which make up the factory overhead and the methods of distributing them first to departments and then to product are summarized in Form 31.

CHAPTER XII

FACTORY OVERHEAD REPORTS

The Source of Overhead Items

Material reports are definite in character and are designed to record only material cost. The compiling of labor cost is also definitely provided for by especially designed time tickets or other labor reports. Factory overhead, being the most complex element of cost, is compiled from divers sources, and therefore the items are obtained from various records, some of which are used for different purposes.

In small manufacturing plants and under very simple conditions of manufacture, the information for compiling the factory overhead may usually be obtained from one record—the expense analysis record. In larger plants the sources from which the factory overhead items are derived are numerous and the items are compiled in many different ways. These sources of information are discussed in this chapter.

Reports for Recording Indirect Material

The indirect material items, as already stated, consist of:

1. Direct material which cannot be applied in a direct manner
2. Supplies
3. Scrap material
4. Small tools and dies

The cost of direct material which cannot be applied in a direct manner and which in consequence forms part of the factory overhead, would be obtained from an analysis of material requisitions. The details of these requisitions should

be summarized separately and a means provided for including them in the factory overhead at the time all other items of direct material are summarized and charged to the various departments, jobs, orders, articles, or processes.

Miscellaneous supplies are used by almost every department of a plant, and the sources for ascertaining their cost would also be the material requisitions. These should provide information enabling them to be summarized by departments so as to obtain the indirect cost of the supplies used in each case.

In large manufacturing plants indirect material and supplies are sometimes transferred from one department to another. When this is done, the department making the transfer should receive proper credit so that the department receiving the items may be charged for their use. If separate department stock records are not kept, transfers should be recorded upon especially designed reports. These should be summarized so that each department can be charged with the indirect material and supplies it has used.

Complications sometimes arise in the treatment of scrap material as a part of the overhead. Such portions of this material as can be used again for manufacturing other articles should not be included as part of the overhead cost. The overhead includes only such scrap material as is worthless and cannot be utilized again in the manufacturing operations.

Scrap material charges applicable to the factory overhead are generally recorded upon a specially designed scrap material report which is compiled daily, weekly, twice a month, or monthly, as required. This report gives details as to how the scrap originated and also details as to kind and quantity, with a complete description of its nature and final disposition.

In large plants where complete information of this kind is obtainable the scrap material reports must be specially handled, and in some cases credit must be given to the cost of

a particular job, order, or article from which the scrap is derived. In these instances the scrap material reports would show the job or order number, or the name and number of the process so credited. The reports would then be summarized for the purpose of ascertaining the total charge to the scrap material accounts, and also the total credit to the direct material accounts. In addition to this summarization the detailed scrap material reports would be posted as a credit or deduction from the material cost of each particular job, order, or process affected, the entry being made upon the respective cost sheets for each job, order, or process.

The cost of perishable tools and dies which are a charge to overhead may, when it is practicable to trace their consumption, be recorded upon especially designed tool reports. In large manufacturing plants, however, this is not always possible, as items of this character are required by the operators daily and in consequence are loosely handled. To keep track of them, stock records should be kept on which they are charged to employees as issued. Individual employees can then be held responsible for any tool which disappears or is broken while in their possession. While this is theoretically the best way of handling these items, in actual practice they are often charged to overhead by means of a depreciation rate or a certain fixed amount to cover the probable loss through wear and tear. If complete records are kept of the use of tools by departments, these records would, of course, provide a means for charging the cost of perishable tools and dies to the overhead of the respective departments in which they are used.

In small plants, where a stock-room is not operated and stock records are not kept, the cost of indirect material can usually be obtained from the purchase records and distribution book or purchase analysis. When miscellaneous supplies are purchased for particular operating departments, the invoices

for the goods are charged on the purchase book directly to the overhead of the departments where the supplies are to be used.

Reports for Indirect Labor

Indirect or non-productive labor, supervision or foremanship, superintendence, inspection, factory clerks' salaries, defective and experimental work, as well as the time of productive workers not applicable to a definite job, order, or article, should all be charged to the factory overhead. The last item mentioned includes all lost, idle, and waiting time, and provision must be made for obtaining information as regards such time from the various labor reports which are submitted daily by the factory employees.

In some large factories all non-productive time is reported upon separate non-productive time or labor reports. This simplifies the preparation of the analysis of overhead charges, and the amount to be charged to department overhead is then very readily obtained.

The time of miscellaneous helpers, truckers, sweepers, repairmen, etc., who do principally non-productive work is often compiled separately when the pay-roll is prepared, enabling this portion of the non-productive charge to be obtained readily from the pay-roll records. In most instances the pay-roll records are ruled so as to distinguish between the productive and non-productive time of departments, thus making unnecessary any detailed analysis.

Productive and non-productive work should, if possible, be accounted for upon separate labor reports. This is especially true when productive workers are transferred to non-productive work and vice versa, either in or between departments. As in the case of supplies, transfers of labor of this character should be summarized by departments so that the total charge and total credit affecting each may be obtained.

The expense of supervision by foremen and others is a more or less fixed item of overhead which, as a rule, may be obtained from the pay-roll records. It is rarely necessary for the supervisors to account for their time daily, except in small shops where foremen sometimes do productive work in addition to their regular work of supervision. When this is the case, the problem arises as to the correct amount to be charged to the particular job, order, or article for the foreman's time.

It would be obviously incorrect to burden the cost of the product with a high rate for the foreman's productive time when such work is undertaken as a matter of necessity, as for instance, to help out the production of the job, or to take care of rush work, or to do work of a special character. Under these circumstances, a regular day or hourly work rate should be established, based on the average wage rate paid for such work in the department. This rate is used for ascertaining the cost of the direct labor charge which is to be applied to the cost of the article produced. When the foreman's productive time is charged as a direct labor cost, the overhead account of his department should receive credit for the same amount, thus reducing the expense of supervision.

In large manufacturing plants the salaries of the factory superintendent, assistant superintendent, and production manager are included among the general operating expenses and with them finally distributed to the departments. The amount of this charge is usually shown on the pay-roll.

When inspection charges are treated as part of the factory overhead, their amount is obtained from labor reports and pay-roll records. The total should then be analyzed and either charged to departments or included in the general operating expenses.

Factory clerks' salaries are, as a rule, shown on the pay-roll records, and their total time is usually chargeable to over-

head. However, in small plants where one set of clerks divide their work between the financial and the manufacturing ends of the business, only that portion of their time which is properly a factory expense should be charged to overhead. The distribution may be based on an estimate of the time spent on each class of work. In large plants, where the departments are well organized, the factory clerks' time, including clerks in the operating departments of the factory, stock clerks, pay-roll clerks, cost department clerks, etc., is charged directly to the department in which the clerks are employed. In this way their salaries are absorbed in the overhead and distributed to the product.

The salaries of the employees who devote their time to correcting defects in the product and to experimental work are often charged to a separate department account termed "Defective Work" or "Experimental Work," which is treated as non-productive. In large manufacturing plants, instructions for such work are issued upon special factory orders. When this is done the material and productive labor costs of each order are compiled upon a separate cost sheet, to which overhead is added in accordance with the method of distribution which best suits the conditions of work in the department.

After the total cost of the defective or experimental work is ascertained, it is charged to Defective Work or Experimental Work account. The charges thus made may then be transferred to accounts which have a tangible asset value, or a portion of these costs may be absorbed in the factory overhead under the caption of "Defective Work" or "Experimental Work," and in that way applied to the cost of the rest of the product manufactured.

Indirect Expenses—Fixed Charges

It should be noted that certain items of overhead such as rent, insurance, taxes, interest, and depreciation are more or

less "fixed" in character. These are so termed because they are incurred whether the plant is operated or not. Hence they are not affected by the volume of production and often the same amount of charge is incurred each period. Provision must be made for charging these items to production monthly or periodically, depending upon whatever cost period is established. In simple cost systems this can be done by entries at the end of each cost period. In some instances it is quite practicable to provide for recording these items through the purchase records or register of accounts payable, but in large plants where departments are numerous, considerable time may be saved by the preparation of schedules of fixed charges.

SCHEDULE OF RENT CHARGE

For the year 19——

Accounts	Monthly Charge	Postings to Accounts				
		Jan.	Feb.	Mar.	Apr.	Etc.
Dr. Cutting Dept.	$150.00					
Machining Dept.	300.00					
Assembling Dept.	350.00					
Finishing Dept.	150.00					
Trimming Dept.	50.00					
Inspecting Dept.	75.00					
Packing Dept.	75.00					
Stock-Room Dept.	150.00					
Warehouse Dept.	200.00					
Cr. Rent	$1,500.00					

Form 32. Schedule of Fixed Charges. (Size, 8 x 5.)

A simple schedule of rent charge is illustrated in Form 32, on which a single entry of the monthly fixed charge may be made to cover the whole year. A check mark placed in the spaces for the charges affecting each department each month indicates that the items have been posted to their proper accounts.

Maintenance, Repairs, and Renewals

The method of recording charges for maintenance, repairs, and renewals depends upon the size of the plant and the organization of the departments. In small plants repairs and renewals are usually made upon the authority of standing factory orders, to the order numbers of which all costs for repairs are charged. At the end of the month the total costs of these standing orders are ascertained and charged to the Maintenance, Repairs, and Renewals account kept with each department of the plant. In this manner they are absorbed in the departmental overhead.

In large plants the cost of small repairs may be charged to standing order numbers, but for repairs of an important character special factory orders are issued. The direct material and direct labor cost of the job are charged to the cost sheet of the particular order covering the special repairs. When the work is completed, the overhead on the job is added, after which the total cost of the work is charged to the Maintenance, Repairs, and Renewals account of the department in which the repair has been made. At the same time any departments which may have done work on the job receive credit. In large plants a mechanical millwright or repair department is usually organized to carry out all repairs, in which case credit for work done should be given to this department.

The question often arises as to whether it is correct to include overhead as part of the maintenance, repairs, and re-

newals cost. True costs consist of direct material, plus direct labor, plus overhead. Repair work must be supervised and recorded, machines and power are utilized, and space in the factory is also necessary. If these conditions are true, certain items of overhead necessarily enter into the repair cost. Furthermore, if repairs were done by outside contractors, these contractors in arriving at the amount to be charged for the repair, would include direct material, direct labor, overhead, and also a margin of profit.

Power Expenses

In a well-organized factory which operates its own power plant, material records are kept showing the consumption of the various materials and supplies used in producing power, from which are compiled the charges for these items. The wages of the power plant employees also are charged directly to this department from the pay-roll records, as well as the items of expense distributed to the power plant department and a proportion of the general operating expenses. After the total costs of the power plant have been determined in this way, they are distributed to the operating departments in proportion to the consumption of power in each. The record which is used for summarizing this information is often termed the "Power Plant Distribution Record" (Form 33).

On the left half of the form are collected and summarized the power expenses for the period. The total of these divided by the horse-power hours (i.e., the total hours of running time multiplied by the horse-power generated) gives the unit charge for each horse-power hour. On the right half of the form the horse-power and the operating time of each machine are recorded in the first two columns. The multiplication of these two figures gives the horse-power hours chargeable to each machine, and this last figure multiplied by the unit charge described above gives the power cost of each machine.

In small power plants it is difficult to record the consumption of material and supplies, and in such case it may be more practicable to take an inventory of the amounts on hand at the end of each month. If this is done, the value of the

POWER PLANT DISTRIBUTION RECORD

For the period..... , 19.....

Analysis of Costs			Distribution					
Details	Amount		Machine	Dept.	Horse-Power	Operating Time	H. P. Hours	Power Cost
Fuel.....			1242	A				
Water.....			1243	A				
Oil and Supplies.....			1244	A				
Engineer.....			1341	B				
Firemen.....			1342	B				
Rent.....			1421	C				
Insurance.....			1422	C				
Taxes and Licenses.....			1423	C				
Depreciation.....			1551	D				
Repairs and Maintenance			1671	E				
Incidentals.....			1672	E				
General Operating Exp..								
.....								
.....								
Total.....								
Cost per H. P. Hour....			Totals...					

Form 33. Power Plant Distribution Record. (Size, 8 x 5.)

material consumed may be obtained by adding to the inventory at the beginning of the month all power supplies purchased during that month and subtracting the inventory on hand at the end of the month. This simple calculation often saves clerical time in small plants.

Where storeroom accommodations are not available, materials and supplies consumed in the power plant may be estimated. Under these conditions the best information obtainable should be used, and the estimated figures should be revised by

taking the actual inventory of the materials and supplies on hand at different times during the year.

Freight and Cartage Inward

When freight and cartage inward are treated as overhead, a freight analysis sheet should be used for compiling the charges to departments. This record, which need not be illustrated, is a simple columnar-ruled sheet so headed as to show the charges as they affect the different departments.

In small plants freight and cartage inward is charged directly to one account which is closed out to general operating expenses and in that manner distributed to departments. In large plants the freight and cartage inward is usually chargeable in different ways; part of it may be added to the material cost, a portion absorbed in the total cost of the new equipment purchased, and the balance included as part of the factory overhead. Where this balance represents a large amount, provision should be made for its distribution either to departments or to the products manufactured. In most cases it is not necessary to design special forms for the distribution or analysis of freight charges, as an ordinary columnar sheet serves the purpose.

Over, Short, and Damage

This item of overhead is obtained from special factory reports. Where material is subject to shrinkage at the time of purchase, provision should be made upon the report of material received for recording any loss in weight or quantity. When shrinkage or damage takes place during the processes of manufacture, a separate departmental material report, or the production report, may be used for the purpose of informing the cost department office. Increase in weight of material should also be reported in order that provision may be made in the office for changes as to quantity produced when summarizing the costs.

Reports showing overs, shorts, or damages should be designed to suit the special needs of each case so that the charges affecting the departments may be obtained.

Distribution or Analysis Record

When collecting the items of factory overhead it will be found that many of them can be obtained from incoming invoices, which are analyzed by means of the purchase record, accounts payable vouchers, or the register of accounts payable.

For the purpose of showing a more detailed analysis of expenses, the purchase record, or register of accounts payable, is supplemented by a "Distribution Record" or "Analysis of Expense Record," the purpose of which is explained by its name. The record provides columns, or separate sheets, for compiling the various detailed items which should be charged to the accounts, showing the classification of the items composing the factory overhead expenses. A considerable portion of the factory overhead items is thereby obtained from the distribution record at the time the invoices are entered in the purchase records.

The items of overhead not found on the purchase records are taken from the records previously mentioned, such as the summary of material requisitions, the summary of departmental materials used, the analysis of labor reports, fixed schedules, and special distribution reports, such as power plant reports, freight analysis, summary of repair orders, and defective and experimental work accounts.

Deferred Expense Record

In every plant expenses are incurred which are only in part applicable to the current cost period. Items of this character would include large repairs, insurance, prepaid taxes and interest, experimental work for the benefit of future operations, and purchases of stationery and miscellaneous supplies.

As only part of these items or expenses are consumed during the current month, provision should be made for distributing them over several months' operations. To this end such expenditures should be charged to a suitably named deferred expense account which is credited at the end of each period with the portion of the charge applicable to the current period. If the items of this character are numerous, a "Deferred Charges" account may be used to control a subsidiary record in which the details of the deferred items would be shown.

Summary of Factory Overhead Reports

Form 34 summarizes the records and reports used for the purpose of collecting and distributing the items of factory overhead.

Factory Overhead Reports	Indirect Material	Material Requisition Material Reports
	Indirect Labor	Labor Reports Pay-Rolls Special Reports
	Fixed Charges	Fixed Schedules
	Repairs and Renewals	Cost Sheets Material Reports Labor Reports
	Power, Light, and Heat	Power Distribution Power Plant Report
	Freight and Cartage Inward	Invoices Freight Analysis
	Over, Short, and Damage	Special Factory Reports

Form. 34. Classification of Factory Overhead Reports

CHAPTER XIII

METHODS OF REPORTING PRODUCTION

Purpose of a Production Report

As explained in Chapter V, a factory order is the notification to the production departments to commence work upon a job, order, or article, the progress on which is shown by means of detailed material and labor reports. Another important link in the cost records is the production report (Form 35). This is a form used for the purpose of notifying the office that the work on a particular job, order, or article has been completed, and that the product is ready either for shipment or to be stored in one of the various stock-rooms of the plant. The production order starts the manufacture of the product, while the production report records quantity produced.

Form of Production Report

There are many kinds of production reports, the form of each and the kind of information furnished depending upon the use to which it is put and the method of cost-finding employed in that particular case. In general, however, these reports may be classified as follows:

1. Simple production reports without provision for recording costs.
2. Simple production reports, provision being made for recording costs.
3. Factory orders used as production reports.
4. Material reports used as production reports.
5. Labor reports used as production reports.

Simple Production Reports

Form 35 illustrates the simplest form of production report. It is prepared at the end of each day by the operating departments and provides for showing the order number,

DAILY PRODUCTION REPORT

.....DEPARTMENT

No.....

Date.....

ORDER NO.	QUANTITY	DESCRIPTION

Approved by..... Prepared by.....

Posted to Stock Records.....

Posted to Summaries.....

Posted to Cost Sheet.....

Form 35. Daily Production Report—Simple Form. (Size 8 x 11.)

quantity, and description of the work completed. It is numbered and dated, the number being placed upon it in advance so that it may be known whether or not all reports are received at the office. The quantity column is used for the purpose of showing the partial completion of a production order

when this covers the manufacture of a large number of articles requiring several days or possibly weeks for their completion.

It should be noted that the form shown does not provide space for recording costs. If necessary, columns may be added to show total cost as well as the details of the material, labor, and overhead costs of departments. If this is done, the signature of the person checking the production report and entering the costs should be placed at the bottom of the form; also the person who proves the mathematical accuracy of the figures should sign the report as evidence that the work has been checked before the costs are transferred to the summary record.

If the order method of cost-finding is used, the question arises as to the necessity of entering a description of each order on the production report. In view of the fact that errors in reporting order numbers are apt to be made, the entry of a description provides a means for identifying the order and thereby eliminates the possibility of error. If the order numbers reported could, however, be relied upon, a production report might take the form of a list of these numbers showing the work completed each day.

Under the process method of cost-finding, the same simple forms may be used if numbers are assigned to definite units of production, even though the costs are compiled for processes. If the volume of production is not specified beforehand, it is not necessary to designate the completed product by means of a number; the quantity and description of the articles produced suffice. If detailed costs are required and provision is made for recording them, an additional total cost column should also be provided for the purpose of proving the mathematical accuracy of the figures. The total of the material, labor, and overhead columns would then equal the amount entered in the total cost column.

Production Reports Showing Progress of Product

Production reports which show department costs may be used for the purpose of crediting the operating departments when work is transferred from one department to another. When one department is credited, either another department or the stock-room account should be debited, depending upon the disposition of the product. In this connection it should be remembered that material in process is usually transferred from one operating department to another, while finished or partly finished product may be stored as manufactured parts or finished parts stock, or may be immediately shipped; or finally, some of the finished parts may be sent to the raw material stock-room to be again requisitioned for the manufacture or assembly of the finished product.

To avoid undue clerical work in factory departments, in many cases the disposition of the processed material is not shown upon the production reports, especially when factory routine is standardized and cost clerks can ascertain the disposition of the product by referring to standard practice schedules. Under conditions where this is not practicable, it may be necessary to provide columns on the production report to show the disposition of the processed material or the manufactured product.

Factory Orders as Production Reports

The factory order may also be used as a production report, the return of the order to the office after the work has been completed constituting a notification of this completion. The duplicate departmental copies are often used for this purpose, each department turning in its own copy of the order as soon as its part of the work is finished. These notifications furnish the data for preparing a production summary, and copies of the factory orders used in this way are virtually production reports.

Tag and Coupon System of Production Report

A production order in the form of a tag, giving a description, quantity to be manufactured, and order number is sometimes attached to the material itself or to a container which holds the material. The tag accompanies the goods through the processes of manufacture until they are completed, when it is sent to the office as a notification of completion, thus constituting a production report. The tag system is sometimes developed to show the quantities transferred from one department to another. When this is done, columns should be ruled on the tag to show the movements by departments of the quantity received, by whom received, date received, quantity produced, and date transferred. This provides a means for keeping track of the flow of materials between departments, and for placing responsibility when discrepancies arise or material is lost in transit.

To illustrate the operation of the tag system, it may be assumed that in the cutting department of a garment factory an entry is made upon the production tag showing that the material for a dozen garments has been cut. When the material is transferred to the sewing department the forewoman of this department signs for its receipt on the tag, and when the tag leaves this department together with the finished garments for which the material is used, an entry is made upon it showing that one dozen sewed garments are sent to the ribboning department where the receipt is again signed for. In this way the tag or ticket follows the order through the operating departments until the goods are completed and the stockroom or shipping-room clerk signs for their receipt. It is then sent to the office where it constitutes the production report.

Under complex manufacturing conditions, the tag system may be further developed by the use of coupons which enable the production report to be prepared in the office in advance. The stub to which the coupons are attached shows the order

number, description of the work, date started, date to be completed, and so on. The coupons themselves provide spaces for recording the order number shown upon the stub, the coupon number, and the quantity produced, both good and defective. Each coupon represents one or a series of manufacturing operations, so that when detached and sent to the office as the various operations are completed, they provide information as to the progress of production.

After all coupons have been received at the office, the stub is sent with the goods to the stock-room or shipping department, a signature on the stub being required at this point to certify that the quantity received is correct. Emphasis must be placed upon the importance of this check upon the quantity at the point where the articles are shipped or stored. The stock-keeper or shipping clerk may either make out a separate report or sign the production stub as explained above, but unless the quantity designated on the production report tallies with the quantity shipped or taken into stock, unit costs cannot be accurately ascertained. After the production stub has been receipted, it is returned to the office where the summary of production prepared from the miscellaneous coupons is compared with the data entered on the stub.

An advantage of the coupon over the simple form of tag is that it enables work in progress to be readily traced by looking up the last coupon received in the office and noting from which department it was sent. In designing coupons care should be exercised to see that the order of the operations is reversed, so that the first coupon to be detached (the bottom one) represents the first operation and the last coupon the last operation.

Material Reports as Production Reports

Under some conditions of manufacturing, material reports may also serve the purpose of production reports. This

is especially true in manufacturing industries where a fixed formula is used for a definite quantity of product. As an illustration, in the manufacture of chemicals, or paints and varnishes, the formulae are fixed as to kind and quantity of materials required to produce a certain yield. Under these conditions the material report, or the bill of material which serves as a requisition for raw materials, may also serve the purpose of a production report when returned to the office. A special production report is then unnecessary, as the insertion of additional spaces for quantity produced, date transferred to stock, and signature showing its receipt are sufficient for the purpose. Material reports may be used in this way under both the order and process methods of cost-finding.

Labor Reports as Production Reports

Where a piece-rate, bonus, or premium plan of paying wages is used, the labor reports of the employees may be designed to serve as production reports. When this is done, a thorough check of the quantity produced is essential, and an inspector's O K should be placed upon individual labor tickets to signify that the articles have been counted and inspected and that the quantity reported has been actually produced. In some industries the labor tickets are made up in coupon form, the return of the coupons to the office signifying that definite quantities of articles have been produced. This method of reporting production by means of the labor reports is applicable to both the order and process methods of cost-finding.

Defective Work Reports

A defective work report (Form 36) is a specialized form of production report, the purpose of which is to report any defects in the product discovered during the process of manufacture. The office should be notified of these defects so that, if possible, they may be corrected and the product made sal-

DEFECTIVE WORK REPORT

.....DEPARTMENT

No.....

Date.....

Order No.....

Quantity on Order.....

Description of Work.....

Nature of Defect.....

.....

.....

Cause of Defect.....

.....

.....

.....

Disposition.....

.....

.....

Remarks.....

.....

.....

.....

Approved by.....

Prepared by.....

New Order Issued.....

Summarized.....

Cost Sheet Entry.....

Form 36. Defective Work Report. (Size 8 x 5.)

able; if this cannot be done, the defective product must be scrapped and disposed of in some other way. If there is any rivalry between operating departments as to which can make the best record and the foremen of all operating departments receive copies of the summary of defective work, it will tend strongly to lessen losses from this cause.

Spaces may be provided on the report for showing the date and the cost of correcting defective work. Under some conditions this cost may be charged to the cost of the particular job or order of which it is a part; under other conditions it may be charged to a departmental overhead account, and in that manner absorbed in the overhead. Whenever it is possible to use some of the material again, it should be taken back into the Materials account at its scrap value and the difference in cost charged to a Defective Work account.

Time of Reporting Production

Production should be reported to the office as promptly as necessity demands. Often time is lost and sometimes material, operating departments become congested, and deliveries cannot be made promptly, because prompt and adequate production records are not available. In large manufacturing plants a tracing department sometimes reaches an exaggerated size for the reason that the information given on production reports is inadequate and production is not reported on time. A thorough system of reports would provide the office with all the necessary information for answering questions and tracing jobs, orders, or articles through the various operations.

Local conditions would govern the time of reporting production, but under ordinary circumstances production should be reported daily; that is, no reports should be allowed to accumulate in the factory and held there to be summarized at the end of the period, when the original records could be sent to the office in the form of a daily report.

Disposition of Product

The product may be disposed of in various ways; it may be shipped at once to the customer or taken into stores as manufactured parts, part-finished stock, or finished stock. If defective, it may be returned to the operating departments for the purpose of having the defects corrected. If it is for "home use" and in the nature of machinery, tools, and miscellaneous equipment, it may be transferred to plant asset accounts.

The disposition of the product should be accurately indicated by means of reports so that the charges may be passed to the proper accounts. A production report is a notification that a particular department claims credit for work done, and when this credit is entered, an offsetting charge must be made to another account. When a standard product is manufactured for stock, the stock account must be debited. Where goods are made for special order and the finished product is shipped, this simplifies the accounting for the credits and charges. In large plants where the production system is complex, definite instructions covering the disposal of the product should be given to each operating department if cost information is to be accurately recorded. It is often practicable to indicate this by the color of the report.

Procedure in Handling Production Reports

The procedure in handling production reports may be indicated as follows: preparation, examination, recording, disposition, and filing. The reports may be prepared by a clerk in the cost department, or by the factory foreman or his clerk. Before they are sent to the office they should bear the approval of the factory superintendent, production manager, or some other responsible person. Whether they are delivered to the office by the factory clerk, or collected by a messenger on his rounds, is immaterial provided they reach the office at regular stated intervals.

PRODUCTION REPORTS

Procedure:
- Preparing
- Collecting
- Examining
- Calculating Cost
- Obtaining Credits for Factory Accounts
- Obtaining Charges for Stock Accounts
- Posting Details to Stock Records
- Filing

- Classifications of Reports
  1. Production of product or parts
  2. Miscellaneous Construction Work
  3. Miscellaneous Repair and Betterment Orders
- Basis for Reporting Production
  1. Factory Orders furnish basis
  2. Material and Labor Reports show progress of job, order, article or process
  3. By orders or processes
- Kind of Production Reports
  1. Simple, without costs
  2. Simple, provision for costs
  3. Factory Order as a Production Report
  4. Material Report as a Production Report
  5. Labor Report as a Production Report
  6. Defective Work Report
- Time of Reporting Production
  1. Daily, weekly, twice a month, or monthly
  2. After completion of job, order, article, or process in each operating department
  3. After final completion and transfer to stock
- Disposition of Production
  1. Transferred to Storerooms
     - Raw Material
     - Finished Parts or Manufactured Parts
     - Partly Finished or Semi-Finished Stock
     - Finished Stock
  2. Transferred to Subsequent Departments
  3. Transferred to Assets Accounts
  4. Transferred to Expense Accounts

Form 37. Classification Chart of Production Reports

When the reports are examined in the office for their correctness, care should be exercised to see that the proper order numbers are given and that the descriptions are sufficient to identify the orders in case of necessity. The examination should also disclose whether the reports are properly dated, numbered, and signed, so that the responsibility of the person making or approving them is fixed.

If the reports provide spaces for recording costs, the details of these would be obtained from the cost sheets or other cost records. If costs are recorded on the reports, provision must be made for ascertaining the total material, labor, and overhead costs to be credited to the departmental accounts. This work should be arranged so as to permit of a proof being made of the accuracy of the calculations.

The disposition of the product will indicate the offsetting debit to the above credit—either a charge to a stock account, an expense account, or a plant asset account, as the case may require. A mathematical proof should also be established for this portion of the work. The completed and semi-finished product taken into stock should be entered upon the records of the stock-room in which it is stored. These postings should be made promptly each day and should be kept up to date so that a perpetual inventory of each item of stock is available.

Production reports may be filed in various ways—according to the dates of the reports, the numbers of the reports, or the numbers of the departments from which they are received. In considering the method of filing, the main point is, of course, to be sure that ready reference can always be made to the original source of information.

Summary of Production Reports

Form 37 summarizes the detailed items to be considered in the routine of production and the devising of production reports.

Part III—Compiling and Summarizing the Cost Records

CHAPTER XIV

COST SHEETS

Scope of Cost Sheet

After the material, labor, and overhead costs are obtained from the detailed factory reports, provision must be made for bringing the elements of cost together. The cost sheet on which the total cost of the job, order, or article, or process is compiled serves this purpose. The record thus furnishes the basis for charging the stock accounts with the cost of the finished product as reported by the operating departments and for establishing a correct selling price.

Cost sheets, often known by such terms as "Cost Cards," "Cost Records," "Job Cost Tickets," "Order Cost Records," "Process Cost Records," etc., may take the form of either loose-leaf sheets or cards. In some few instances they are prepared as ledger accounts and preserved in bound book form.

Cost sheets are used to gather the cost of:

1. All product which is manufactured and sold.
2. All the necessary parts thereof.
3. Machinery, tools, miscellaneous equipment, and all other items of a permanent value constructed for use in the factory.
4. Repairs, renewals, betterments, and maintenance items, which are chargeable to the factory overhead.

The Job or Order Cost Sheet

The design of a cost sheet to meet particular needs is to some extent determined by the method of cost-finding in use. When costs are ascertained by jobs or articles it is usually necessary to make out a separate cost sheet for every factory order issued. But when a large number of factory orders are issued for similar products, these orders, as already stated, may often be conveniently grouped and the cost obtained for the group. This eliminates a large amount of detail work involved in the handling of each order separately. However, if the cost of each job is required in detail so that comparisons may be made, separate cost sheets may have to be compiled for each order. Another reason for doing this is to insure the accuracy of the detailed entries. If costs are compiled on certain items of production only, the factory employees may discover this fact and in consequence, when charging material and labor on the detailed reports, may enter their time inaccurately to jobs which they know are not being checked thoroughly.

The Process Cost Sheet

Under the process method of cost-finding, the figures gathered on the cost sheets cover the cost of each process over a definite period of time which may or may not conform to the regular cost period. Thus, the process cost sheet gives the same information as a job order cost sheet regarding the material, labor, and overhead costs, the only difference being that the record relates to the quantity produced during a definite period of time and not to a given and predetermined quantity of production. The total cost shown should be divided by the total quantity produced to ascertain the unit process cost, and the cost of the various processes added together gives the total article cost. Form 38 illustrates the general method of summarizing the detailed cost of a particular process. While

PROCESS COST SHEET

No..............................

For the period..19......

Process.. Article...

Material Costs					Labor Costs		
Rept. No.	Details	Quan-tity	Price	Amount	Employee's No.	Days and Amount	Total Amount

Production		Summary of Costs	
Good..		Material Cost..	
Defective..		Labor Cost..	
Total..		Overhead Cost..	
Unit Cost..		Total Cost..	

Checked.. Approved.. Summarized..

Form 38. Process Cost Sheet. (Size, 11 x 8.)

seemingly complicated, the study of the form will readily make clear the method of summarizing the cost of the process.

Information in Heading

In the heading of each cost sheet should appear information as to which order the costs gathered on the sheet apply. Under the order method of cost-finding, complete headings would consist of the following:

1. Name of customer.
2. Address of customer.
3. Customer's order number.
4. Instructions as to delivery.
5. Date work is required.
6. Name and description of article to be manufactured, with reference to blue-print number, drawing, sketch number, model number, or correspondence.
7. Quantity of articles to be manufactured.
8. Date of issuance of factory order.
9. Date to be completed.
10. Factory order number.

The information entered at the top of each cost sheet, all or part of which may be essential, is obtained from the copy of the factory order issued to the operating departments. In fact, these headings may be a duplicate carbon copy of the factory order, the details of which are taken from the customer's original order.

The preparation of the headings of cost sheets may be done by the order department or by a clerk in the cost department to whom are sent copies of all factory orders. Different styles of cost sheets are often used in the same plant for gathering cost information on the various articles and processes as the occasion may require; therefore, whoever handles the work should be thoroughly familiar with the product so as to know exactly what kind of cost sheet to prepare.

Details Shown on Cost Sheets

Though the uses to which cost sheets are put are more or less standardized, the amount of detail entered upon them differs greatly under diverse conditions of manufacture. In some cases all that may be required are the figures covering the three elements of cost. In other cases the information they contain may serve as a means of controlling the work in process in the various operating departments. In this connection they may be considered as subsidiary ledger accounts showing the details which go to make up the work in process inventory —in the same way as the raw stock records control the details of the raw material inventory.

The varying amount of detail which cost sheets may contain is illustrated by the following enumeration:

1. Total cost.
2. Total material, labor, and overhead costs.
3. Departmental material, labor, and overhead costs.
4. The details of the material, labor, and overhead costs in each department.
5. Transfer of cost from one department to another, provision being made for recording the total cost up to and including previous operations.

Simple Form of Cost Sheet

A cost sheet in its most simple form may be merely a tag or a ticket, such as is attached to the merchandise of a retail or jobbing concern, giving the cost and selling price of an article. Such a tag takes on the mark of a factory cost sheet when the cost of the article is divided into three elements as shown in Form 39.

Such a form as this is often used under simple conditions of manufacture, or where predetermined or estimated costs (see Chapter XXVIII) are first figured and entered on a form to be compared later with the actual production figures.

O

Name of Article.....

Material Cost.....	.....
Labor Cost.....	.....
Overhead Cost.....	.....
Total Cost.....	.....
Selling Price.....	.....

Form 39. Cost Tag. (Size, 2 x 3.)

Departmental Cost Sheets

Where the factory is departmentalized it is necessary, for administrative purposes, to ascertain costs by departments. Form 40 shows the elements of cost in this way, in summarized form, the data being obtained from detailed records.

The two simple forms so far presented are used either

Name of Article.....

	Total Cost		Dept. No. 1		Dept. No. 2		Dept. No. 3		Dept. No. 4	
Material Cost.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Labor Cost.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Overhead Cost.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total Cost.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Form 40. Departmental Total Cost Sheet. (Size, 8 x 3.)

COST SHEET

.....DEPARTMENT

Order No.....

Date.....

Article and Description.....

Material Costs						Labor Costs											
Rept. No.	Description	Quantity	Price	Amount		Employee's No.	Hours					Total Hours	Rate	Amount	
	Total					Total									

Checked by.....

Summarized.....

Approved.....

Form 41. Individual Departmental Cost Sheet. (Size, 11 x 8.)

under conditions where costs have been standardized, estimated, or predetermined, or where a summary of costs is desired. They do not provide for the postings of the detailed material and labor reports—a necessary procedure in the routine of complete cost-finding. These details are often entered on separate departmental cost sheets, to which overhead is then added in proportion to the charge in each department. A departmental record of this character is shown in Form 41, on which the postings from material and labor reports are made directly.

Detailed Summary of Costs

When it is practicable to show the details of cost and their summarization by departments on the same record, there are obvious advantages to be gained by thus reducing the number of forms. The use of such a cost sheet, however, is only feasible when the kinds of raw material used are few in number and when the labor operations are comparatively simple. These conditions are usually found in a wood-working plant and Form 42 which is used in this industry illustrates the method of summarizing the details of cost on a single sheet. The "summary of costs" and the detail of the "material costs" are gathered on one side of the sheet and the detail of the "labor costs" on the other side.

A study of Form 42 shows that its ruling provides for summarizing the elements of cost of each customer's order by departments and comparing the total cost after freight is added with the list price. Into the method of recording the detail of material and labor costs it is needless to enter. The point here to note is that all the data relating to the cost of a particular article are entered on one sheet and that reference thereto furnishes any detailed information that may be required.

When the kinds of material used in manufacture are numerous, they may be conveniently printed upon the form.

Article..... Order No.....

Customer	Finish	Their Order No.	Date	Sketch No.	Shop No.
.....	.....	.....	.....	.....	.....

SUMMARY OF COSTS

Material.....																								
Labor.....																								
Overhead.....																								
Total.....																								

Freight.....
Total Cost.....
List Price.....
.....

Charge Account..... Date.....
Remarks.....
.....
Signed.....

MATERIAL COSTS

.....											.....													
.....											.....													
.....											.....													
.....											.....													
Total.....											Total.....													

Form 42. (a) Complete Cost Sheet, Giving Departmental Details (face). (Size, 11 x 8.)

LABOR COSTS

Name	Hours	Total Time	Rate	Amount	Name	Hours	Total Time	Rate	Amount	Name	Etc.

Form 42. (b) Complete Cost Summary, Giving Departmental Details (reverse)

Where production is planned and routed and in consequence the sequence of operations is fixed, details as to labor cost may also be entered upon the cost sheet in advance. In compiling costs, it is then only necessary to enter the figures as to material and labor consumption when the job is reported finished in the various operations.

Progressive Cost Sheet

Another style of cost sheet, termed a "Progressive Cost Sheet" (Form 43), is used where the figures are carried from one department to another until the final costs are obtained. A separate record is employed for each operating department. In the first department no record is, of course, made under the heading "Previous Operations," but all the other columns are used. The material and labor costs are obtained from the detailed material and labor reports, and provision is made for entering the indirect costs, depending upon the method of overhead distribution in use. The production of the department is shown and provision is also made for showing the total cost. When the work progresses to the next department, the cost of the previous operations is transferred, and so on cumulatively through the operating departments.

Schedules of Estimated Costs

In industries where the product is of small intrinsic value or where a large variety of articles are manufactured which differ one from another only in unimportant details, it is often impracticable to ascertain the cost of each kind or style of article separately. In such cases the article cost is carefully estimated in advance of its manufacture; a number of articles which are similar in their style or design are grouped; and the costs for the groups are then ascertained and compared with the estimated figures as a means of checking the cost of production. This method of cost-finding is explained in detail in

PROGRESSIVE COST SHEET

.....DEPARTMENT

Order No.....

Date.....

Article and Description.....

.....

Previous Operations			Material Costs		Labor Costs				Summary	
Quantity	Rate	Amount	Rept. No.	Amount	Rept. No.	Amount	Rept. No	Amount		
									Previous Costs	
									Material Costs	
									Labor Costs	
									Overhead Costs	
									Total Costs	
									Quantity	
									Unit Cost	

Checked..... Transferred.....

Approved..... Summarized.....

Form 43. Progressive Cost Sheet. (Size, 8 x 5.)

Chapter XXVIII. For the present all that it is necessary here to note is that when costs are predetermined in this way the cost sheet takes the form of "Calculation Blank" or "Estimated Cost Schedule" and is known as such. These differ in their form and general style, varying from a simple statement of material and labor cost to an elaborate schedule showing the details of all costs.

Form 44 illustrates a calculation blank used in a garment factory. In making up the estimates the figures are based

CALCULATION BLANK

Article..... Style No.....

Description.....

.....

MATERIAL COSTS:		
Cloth.....	.....	.....
Cloth.....	.....	.....
Trimmings.....	.....	.....
Trimmings.....	.....	.....
Ribbons.....	.....	.....
LABOR COSTS:		
Cutting.....	.....	.....
Sewing.....	.....	.....
Trimming.....	.....	.....
Finishing.....	.....	.....
Inspecting.....	.....	.....
Pressing and Boxing.....	.....	.....
OVERHEAD COSTS.....	.....	.....
Total.....	.....	.....
Selling Price.....	.....	.....

Approved by..... Prepared by.....

Form 44. Calculation Blank Used in Garment Factory. (Size, 6x11.)

upon the opinion of either the designers of the garment, or that of the factory foremen and other supervisors. It will be noted that the estimates are prepared for the quantity, kind, and price of material, the time, amount, and kind of labor, and the overhead. In this way a selling price can be determined in advance of manufacture.

Standard costs, where these have been established, may also be used in making up the estimates. The information entered on the cost sheet then serves as a means of checking or comparing the current with the former costs of production.

Posting Cost Information

In entering up the cost sheets the transfers of entries from factory orders and labor and material reports or summaries may be termed "posting" and would include the following:

1. Entering the data in the heading on the cost sheet.
2. Posting material reports.
3. Posting labor reports.
4. Entering overhead costs.
5. Entering quantities.

Posting Material Reports

The postings of material costs consist of the transfer of the information shown by the detailed material reports so as to ascertain the total material cost of the article manufactured. In posting this information, all or part only may be transferred from material reports. In some cases an entry of the date, material report number, and cost of material will suffice, the material reports themselves being attached to the cost sheet and filed with it. Often, in printing establishments for example, the cost sheet takes the form of an envelope in which the detailed reports are inserted, a summary of the total cost appearing on the outside of the envelope.

Where it is necessary to post complete information as to material costs on the cost sheets, the data should include:

1. Date of material report
2. Material report number
3. Detailed description of material used
4. Cost of material used

The above data would be gathered from material requisitions, bills of material, departmental material reports, material transferred reports, credits for materials returned to stockroom, and any other specialized material reports.

Posting Labor Reports

As in the case of material postings, the postings of labor costs may include part or all of the following information shown upon the labor reports:

1. Date
2. Operator's number and name
3. Time worked
4. Quantity produced
5. Labor cost

Where the labor is constantly changing, it may prove advantageous to have the names of employees appear upon the cost sheets in addition to their numbers. If an envelope form of cost sheet is used, a summary of the labor cost may be entered upon the outside of the envelope and the labor reports filed inside. In instances where the overhead distribution is based upon time, the total hours worked on the job or process must be recorded. To sum up, the conditions in each case must determine the precise data to be entered on the cost sheet.

Entering Overhead Costs

In all cases provision should be made for entering on the cost sheet the overhead or special expenses applicable to the

job, order, or article to which each form relates. If the overhead rates are fixed, overhead costs may be added as soon as the work is completed in each department. Where the rates fluctuate, it may be necessary to postpone the overhead cost entries until the rates are obtained at the end of the cost period. Overhead costs, as a rule, appear only upon the summary of costs.

Under the process method of cost-finding, and where the machine rates for distributing the overhead are established and these machine rates include the labor cost, the labor and overhead costs are combined and appear as a combined amount upon the process cost records.

Entering Quantities

The cost sheet should always show the quantities produced in each operation or process. This information is obtained from either the labor reports or production reports of the factory departments. It is essential to keep account of these quantities, as leaks of material can be discovered promptly only when this information is properly posted. Cost information is of value only when it is kept up to date. Too much stress cannot be laid upon the fact that all detailed reports should, where possible, be posted daily.

Mechanical Aids for Posting Costs

The posting of data to cost sheets entails much clerical labor which may often be saved by using a tabulating machine of some kind. Under certain conditions, and when a cost system necessitates a large amount of posting, one or more of these machines may be used to advantage to record and compile costs speedily and accurately, with a corresponding saving in time and the cost of clerical work.

The compiling of cost information covers such a vast amount of detail that it is well to keep costs as nearly as pos-

sible up to date. Often when this work is postponed until the job is completed, detailed material and labor reports are lost and true costs cannot then be obtained. If the information is compiled daily as the current reports come to hand, the figures are much more likely to be accurate than if records are allowed to accumulate until the origin of any doubtful facts or figures is forgotten.

Checking Costs

The accuracy of the information entered on the cost sheet is not to be depended upon unless a thorough system of checking costs is installed. Accountants often place too much emphasis upon the mathematical accuracy of the work and give too little attention to the article cost as shown on the cost sheet. Material and labor reports may be disposed of promptly, and overhead costs may be carefully compiled, but unless the figures are checked so that the article costs are reliable, the system is not serving its true function. Therefore, a method of checking the information compiled upon the cost sheet must be provided for. This may be done in one of two ways:

1. By means of verification with the actual facts obtained from blue-prints, drawings, sketches, or models of the article manufactured.
2. By means of a comparison with predetermined, estimated, standard, or previous costs.

The checking of the data by the first method requires a practical man who understands the material and labor requirements from the information at hand as shown by blue-prints, drawings, etc. If the figures are found to be incorrect, an investigation should be made and the matter taken up with the foremen of the departments in which the discrepancies arise. Errors may be due to carelessness in posting or to mistakes in

the detailed material and labor reports of factory employees. If material and labor costs are entered inaccurately and the source of the error cannot be discovered, the probabilities are that other jobs, orders, or articles are being charged too much or too little. After the material and labor costs are checked, the overhead cost should be recalculated. Where standard or process costs are used, the current figures may be compared with those of previous periods. This comparison is important, as it often shows discrepancies the rectification of which results in a more accurate method of estimating and in the elimination of inefficiencies.

When a bid or selling price is based upon an estimate of cost, the actual cost should always be compared with the estimate as a means of determining the correctness of the original bid or quotation.

In cases where it is necessary to change the figures of cost sheets, provision should be made for summarizing the adjustments and including them in the entries made to the controlling accounts.

Summary of Procedure

The procedure in handling cost sheets may be summarized as:

1. Preparing the cost sheets.
2. Posting the information as shown by the detailed material, labor, overhead, and production reports.
3. Compiling and proving the costs; that is, adding the departmental material, labor, and overhead costs and transferring the results to the summary of costs so as to show the job, order, or article cost.
4. Checking and comparing the costs so that discrepancies may be eliminated and true costs established.
5. Disposing of the cost sheets, which would include transferring the costs to:

- **Cost Sheets**
  - Preparing
  - Posting
  - Compiling and proving
  - Checking and comparing
  - Disposition:
    - Production reports
    - Stock records
    - Plant asset records
    - Sundries
  - Statements
  - Filing
  - Contents
    1. Cost of job, order, or article
    2. Cost of process
    3. Grouping of small jobs, orders, or articles
  - Kinds of Cost Sheets
    1. Show Total Costs
    2. Show Total Material, Labor and Overhead Costs
    3. Show Departmental Material, Labor and Overhead Costs
    4. Show { Details of Material / Details of Labor / Details of Overhead } in each Department
    5. Show Transfer of Previous Costs
  - Posting Cost Information
    1. Heading Cost Sheets
    2. Posting Material Reports
    3. Posting Labor Reports
    4. Entering Overhead Costs
    5. Entering Quantities
  - Checking Costs
    - With blue-print, drawing, sketch, or model
    - With Predetermined or Estimated Cost
    - With Standard Cost
    - With Previous Cost

Form 45. Classification Chart of Cost Sheets

(a) The production reports
(b) Stock records
(c) Plant asset records
(d) Other summaries

Method of Filing Cost Sheets

Cost sheets may be filed according to order numbers, names or numbers of articles, customers' names, customers' order numbers, or in various other ways. Whatever method of filing is adopted, a cross-index should be provided so that the sheets may be referred to promptly. If filed by customers' names, alphabetically arranged, it may be well to have an index by article and order numbers, so that any sheet may be referred to if the order number or name of the article only is known. If filed by names of articles, a cross-index by customers' names and order numbers should be provided.

Summary of Method of Compiling Cost Sheets

Form 45 summarizes the information entered on different kinds of cost sheets and the method of posting and checking the data they contain.

CHAPTER XV

STOCK RECORDS

Purpose and Kind

Stock records and the method of keeping them are important features of every cost accounting system, for the reason that they can be made to serve as a perpetual inventory of materials, finished parts, and finished product. Such an inventory obviates the necessity of taking a complete physical inventory at periodical intervals in the various storerooms and departments of the plant, and financial statements may be prepared at any desired period by using the information which is furnished by the stock records as a basis for compiling inventory values.

Though the details of keeping stock differ in different industries, the records are more or less standardized, and standard forms are now supplied by the larger stationery and printing establishments.

Method of Keeping Stock Records

The stock records constitute the subsidiary ledgers which show the detailed movements of merchandise items. They are controlled by the stock accounts kept in the factory ledger or the general ledger. These stock records may be classified as follows:

1. Raw material stock records
2. Work in process stock records
3. Finished parts stock records
4. Finished product stock records
5. Miscellaneous stock records

Stock records sometimes show quantities only, or they may include monetary values. As a considerable portion of the detail work is eliminated if quantities only are shown, this is the common practice. When an inventory is taken the stock is priced at either cost or current market price, and the total values as shown on the detailed stock records are compared with the balances of the various controlling accounts. If any discrepancies are found, the necessary adjustments are then made between the controlling and the detail figures.

The better practice, however, is to provide for showing monetary values on the records. When this is done, there are several methods of pricing the raw materials as they are withdrawn from stock. Stock issued may be priced at:

1. The cost value of the goods which have been in stock for the longest period.
2. The cost value of the goods which have been most recently purchased, i.e., the merchandise which has been in stock the shortest time.
3. The highest cost, thereby charging the high-priced items to production first and thus guarding against a drop in their market value.
4. The average price paid for all the merchandise.

The above methods apply with equal force to all items of finished parts and finished stock, as the values of these tend to fluctuate in the same way as material values. No matter which of the four methods mentioned is used for pricing withdrawals from stock, it should be remembered that when a physical count is made or inventory is taken from the information on the stock records, values should be placed at cost or market price whichever is lower. It may then be necessary to adjust the stock records and controlling accounts so as to start the new period with values which will be in agreement with the inventory figures shown on the financial statements.

Raw Material Stock Records

The raw material stock records show the value of the raw material received, stored, and issued. As their function is fully treated in Chapter VI, which deals with material and material reports, there only remains to consider here the various kinds of records. These may be grouped as:

1. Records covering the main stores, subdivided in some plants into direct material items and miscellaneous supplies.
2. Records dealing with the items stored in various sub-storerooms throughout the plant.
3. Records dealing with departmental storerooms where it is necessary to keep a supply of material or miscellaneous supplies on hand.

Departmental storerooms are common in large plants where a standard product is manufactured and where part of the material and supplies must be close at hand to keep up a steady production. Under these conditions separate sets of distinctively designed records may be necessary. For instance, in a large furniture factory there might be separate stock-rooms and stock records for the lumber stored in both the general lumber yard and in the kilns. Other records and separate storerooms might be required for the large items of hardware used in manufacture, for the main raw material items other than those mentioned, and for supplies.

Work in Process Stock Records

As explained in the preceding chapter, the cost sheets constitute the inventory, i.e., the stock records of work in process. Thus any information required as to the value of work in process of a certain kind or in a particular department, can readily be obtained by classifying the cost sheets by kinds of articles manufactured or by departments.

Finished Parts Stock Record

The finished parts stock records show the value of all finished or manufactured parts stored in various locations of the plant. Like the raw material records, they may be divided into:

1. Records for the main stores, which would probably cover all the finished parts stock.
2. Sub-storeroom records showing the items of finished parts stock stored in various departments.
3. Records for different classifications of the product; e.g., one set for the finished parts, another for the major or larger assemblies, and a third set for the minor or smaller assemblies.

The same kind of form may as a rule be used for recording the finished parts stock items as is used for the raw material items.

Finished Stock Records

Finished stock records, as the term implies, relate to the salable product kept in stock. Different sets of records may be operated for:

1. The product stored in the main warehouses.
2. The stock stored in the branch warehouses.
3. Any finished stock out on consignment.
4. Reserve stock held especially for orders in hand.
5. Different classifications of the product.

Simple Types of Stock Records

A simple form of stock record is illustrated in Form 46. This is used in a retail garment business, where a small quantity only of each article is carried in stock. When an item is taken into stock, details as to the date of receipt, style number, description of the garment, and cost price are entered in the

columns provided for the purpose. After its sale the date, charge sale or cash sale number, and customer's name are recorded. The form illustrated may be used in all cases where each item of stock is accounted for separately and when it is desired to keep a record of the turnover of certain styles or articles in a line.

FINISHED STOCK RECORD

Article.....

Style No.	Date Received	Cost		Date Shipped	Sales No.	Customer's Name

Form 46. Finished Stock Record. (Size 8 x 11.)

Form 47 is an equally simple type of manufacturing record which may be used for either raw material or finished parts stock. The ruling and the column headings are self-explanatory.

Records of Stock Available for Unfilled Orders

It is often desirable that the stock record should separate the stock available for future orders and that required for orders in process or received. When orders are taken long in advance, the question of prompt delivery becomes important.

FINISHED PRODUCTS AND PARTS

Style..... Maximum.....
Article..... Minimum.....

Produced or Bought						Used or Sold			Balance		
Date	Quantity		Cost	Amount		Quantity	Amount		Quantity	Amount	

Form 47. Finished Product or Parts Stock Record. (Size, 8 x 5.)

The finished stock records should then show the orders received, the sales or orders filled, and the number unfilled—as illustrated in Form 48. Inquiries can then be answered promptly when the customer telephones or writes for information as to the delivery of merchandise still to be shipped.

Consignment Records

Consignment records for finished stock which has been shipped either on memo or on consignment should, if required, be devised to suit particular needs. Though a record of the goods on consignment is invariably kept either in the factory or in the general ledger accounts, in cases where such shipments are numerous and frequent it is well to keep a separate set of stock records covering the movements of the consigned stock.

FINISHED PRODUCT

Classification No.....
Maximum.....
Minimum.....
Bin No.....

Article.....

Production				Orders		Sales				Un-filled Orders	Balance		
Date	Quan-tity	Rate	Amount	Rec'd	Can-celled	Sheet No.	Quan-tity	Rate	Amount		Quan-tity	Rate	Amount

Form 48. Finished Product Stock Record, Showing Filled and Unfilled Orders. (Size, 8 x 5.)

Semi-Finished Goods Stock Records

Any semi-finished product that is not taken care of either by the cost sheets or finished parts records, may be recorded upon a separate set of part-finished or semi-finished stock records. These are so closely allied with finished parts stock records that they may be treated in the same way. Where it is necessary to send raw materials and work in a partly completed stage to outside contractors, this material is really sent on consignment, payment being made for the labor expended upon it when the goods are returned. It is necessary to keep a complete record of the movements of this class of material. If the merchandise is returned promptly, say within a week or two, a copy of the invoice rendered when the work is sent out may serve for record purposes. After its return this copy may be given to the contractor as a receipt of delivery, or another invoice may be prepared showing the payment for the work done. This procedure eliminates the necessity of keeping stock records. When material remains out for a considerable length of time, it may be necessary to keep track of it by means of more complete records.

Procedure in Handling Stock Records

Stock records are virtually ledger accounts and therefore should be treated as accounting records. The procedure may be summarized under the following headings:

1. Starting the records with the inventory balance.
2. Posting the charges.
3. Posting the credits.
4. Testing their accuracy.
5. Proving with factory accounts.
6. Proving with physical inventories.
7. Balancing and adjusting.
8. Filing.

Entering Inventory Balances

A cost system can give accurate results only when the original inventory is accurate. The opening inventory should include the quantity and value of all raw material, work in process, finished parts, and finished stock. All these quantities and values must be transferred to the stock records and this information constitutes the first set of entries thereon.

Posting Charges and Credits

The charges posted to the different stock records are obtained from various sources, such as invoices, material received reports, material transferred reports, stock transfer reports, and production reports. The credit entries would be obtained from material requisitions, reports of shipments, production reports, and miscellaneous stock transfer reports. Postings should be made daily if possible, so that the records may always show the true state of the inventory.

In posting the various charges and credits, the method of determining the prices should be well understood and established in accordance with a standard practice which should be consistently adhered to.

Testing, Proving, and Adjusting

The balances of the stock records should, from time to time, be compared with the actual quantities on hand. The raw material, finished parts, and finished stock items may be tested at regular intervals during the year to insure the records being in agreement with the actual facts. The work in process stock records, i.e., the cost sheet figures, should be checked at the end of each cost period, especially on those jobs which have been in process for a long time. Under lax conditions it is not uncommon for a job to leave the operating departments and be disposed of in some way without its being reported to the office. A cost sheet showing a portion of the accumulated

costs might remain in the office and no disposition be made of the item because the foreman or factory clerk has failed to report that the work or job has been completed. Such work in process should never be allowed to remain dormant, and all inactive items should be investigated and properly disposed of by means of accounting adjustments. In factories where a large number of small orders are always in process, uncompleted work tends to accummulate and congest operations.

The frequency with which the various stock records may be proved with the controlling accounts will depend, to a large extent, upon whether or not money values are recorded on the detailed records. When money values are shown, a detailed list of the balances may be prepared at the end of each cost period or at such time as proof is desired. This list constitutes a trial balance of the stock records, and the total of all the balances should be in agreement with the balances of the different controlling accounts as shown in the factory ledger or the general ledger.

If money values are not shown upon the detailed stock records, a proof is made at such time as physical inventories are taken and the stock items are priced. When this is done it may be necessary to adjust differences between the detailed and the controlling balances. Such discrepancies may be due to errors in figuring or to differences which arise in calculating the material reports when the figures run to fractions or several decimal points. When adjustments are found to be necessary, an attempt should be made to discover the cause of the discrepancies and to eliminate the inefficiencies of which they are evidence.

Loose-Leaf Versus Bound Stock Record

Stock records may be kept in the form of a bound book, loose-leaf sheets, or upon loose cards. As they are in fact ledger accounts, they should take the form of a ledger showing

debits and credits. In deciding which is the most serviceable form, the size of the record should be considered. Large cards are unwieldy to handle, and if it is decided that they should be used, an effort should be made to keep them within the standard sizes so as to permit their convenient manipulation. Loose-leaf sheets or cards are more practicable than bound stock records, as the records of slow-moving or obsolete stock items can be removed from the binder or file, thereby saving time in reference.

Obsolete Stock Record

In every stock-keeping system, records of slow-moving or obsolete items of stock should be eliminated. It is often practicable to keep a separate "obsolete" section for these questionable items, in which the records relating thereto are filed. In large manufacturing plants obsolete or "dead" items tend to accumulate. Provision should be made for keeping a close watch over this tendency and reducing the "dead" items to a minimum, thus economizing in the capital investment.

Filing Stock Records

The filing and arrangement of the stock records will depend to a large extent upon the classes of merchandise carried in stock. If the items are known by definite symbols, the records may be arranged and filed according to the symbols used. Symbols, it may be noted, are a useful and time-saving means of referring to a large number of records, and as numerous postings have to be made to these records it will be seen that a quick means of reference is a desirable feature. When numerous sizes of each article are kept in stock it is sometimes convenient to summarize the various sizes on one stock record, this main record being supported by individual records showing the quantity on hand of each size.

CHAPTER XVI

SUMMARIZING RECORDS—CHARGING FACTORY EXPENDITURES

Purpose of Summarizing Records

Where an attempt is made to keep costs for the purpose of ascertaining selling prices which will net a reasonable profit, the cost sheets should record true facts as nearly as it is possible to obtain them. Often these records are supplemented by a comprehensive system of stock reports, but at that point the accuracy of the system breaks down. No provision is made for summarizing the various details so as to permit of an accounting proof of the mathematical accuracy of the detailed records. In other words, an elaborate system of reports dealing with factory routine is installed which is separate and distinct from the accounting records, there being no connecting link between the two sets of records.

This link is provided by certain cost summarizing records which are used for the purpose of compiling material, labor, and overhead costs as a basis for making entries to the factory ledger controlling accounts. These entries are made in order to summarize, for the period, the following data:

1. Factory expenditures.
2. Transfers of material, labor, and overhead items between departments.
3. Credits to departments for work done.
4. Miscellaneous adjusting entries.

Each of these four different kinds of controlling entries needs its own summary records. Those relating to factory expenditures are discussed in this chapter, leaving for later con-

sideration the summaries covering transfers, credits, and miscellaneous adjusting entries.

Cost Period

Summarizing records are prepared at the end of the cost period, which is the unit of time covered by the review of factory operations. In most plants the cost period is in agreement with the pay-roll period. For example, in the majority of cases wages are paid weekly, and for this reason the financial year is often divided into thirteen periods of four weeks each. Where wages are paid once or twice monthly, the calendar month may constitute the cost period. Again, the year may be divided into twelve cost periods, regardless of the number of days in each month. When wages are paid weekly and there are twelve cost periods to the year, the common practice is for two four-week periods to be followed by a five-week period, and so on throughout the year. The calendar month is sometimes used as a cost period even though wages are paid weekly, and in this case the accrued wages must be taken into consideration at the end of each month. But to obviate the clerical work involved in calculating accrued salaries and wages, the cost period is usually in agreement with the pay-roll period.

Charging Factory Expenditures

The accounting records on which charges are compiled for entry upon the controlling accounts, include the following:

1. Purchase record
2. Accounts payable voucher and voucher register
3. Summary of material received
4. Expense distribution record
5. Pay-roll and pay-roll analysis

In some cases the department charges for material may be obtained from either the purchase record or voucher regis-

ter, or from a distribution sheet if a more detailed analysis is made on such a record. In other cases the source of the material charges is a summary of material received. The departmental labor charges are in all cases obtained from a pay-roll record or analysis of the pay-roll.

The departmental overhead charges are obtained from both the purchase record (or voucher register, if this be used instead of a purchase record) and the pay-roll or pay-roll analysis, and distributed to the expense distribution record or analysis sheet.

Method of Handling Purchase Invoices

Creditors' invoices for materials, supplies, and equipment are the source for the entries upon the purchase record. The invoices should be supported by the reports of material received, purchase requisitions, and purchase orders as a check against quantity, kind, and price of material ordered and received. When invoices are entered on the purchase record, it is customary to stamp thereon all or part of the information given in Form 49. The number of details included in the

Invoice Number.....
Date Material Received.....
Material Received Report Number.....
Purchase Requisition Number.....
Purchase Order Number.....
Quantity O. K.....
Price O. K.....
Extensions O. K.....
Approved.....
Entry on Stock Records.....
Entry on Purchase Record.....

Form 49. Invoice Stamp, Covering Data for Purchase Record (Size, 3 x 3.)

stamp will, of course, be determined by the needs of the case. The persons responsible for filling in the details should sign their initials to show that they have taken care of the matter. After the invoices have been properly stamped and found to be correct, they are ready for entry in the purchase record.

Purchase Record

The purchase record (also termed "Invoice Book," "Purchase Journal," "Invoice Journal," and "Purchase Analysis"), gathers and classifies the material charges and certain items of expense. Its columns provide for recording the date, in some instances the number of the invoice, the name of the creditor, and the posting references. The money columns show the total amount of the invoices and the distribution of the items to the material, expense, and equipment accounts affected. Additional columns often describe the articles purchased and give information as to terms of payment. As, however, every entry should be supported by an invoice or voucher of some kind, it should not be necessary to write all details in a summary record of this character. Form 50 illustrates a simple form of purchase record.

Posting from Purchase Record

In posting from the purchase record, the total of all the invoices is credited to the Accounts Payable controlling account, if this account is kept, while the amounts entered in the total column are credited to the various creditors' accounts in detail. The totals of the distribution columns with the exception of that devoted to miscellaneous items, should be debited to the accounts affected, while the items entered in the miscellaneous column should be posted in detail to the debit of each account named therein. When separate general and factory ledgers are used, care must be exercised to see that the proper control is established between the two ledgers.

PURCHASE RECORD

For.....19.....

Date	Invoice No.	Name of Creditor	Folio	Total Amount	Distribution											
					Raw Material		Factory Expenses		Administrative Expenses		Miscellaneous					
											Account		Amount			
		Amounts forwarded.....														

Form 50. Purchase Record. (Size, 14 x 11.)

Accounts Payable Voucher

Instead of the purchase record described above, invoices may be entered in a voucher register, thus eliminating the creditors ledger. Under these circumstances, an accounts payable voucher form is often used for the purpose of listing and classifying the invoices received during a definite period from one particular creditor. (See Form 51.)

Voucher forms are numbered in advance and each form provides for recording the dates of the voucher and invoices, the name of the creditor, the date of payment, check number or cash book reference number, the signatures of the person who prepares the voucher and the executive who approves it. As the primary function of a voucher is to analyze the invoice charge, the names or symbols of the accounts which may be

Date of Invoice	Particulars	Amounts			
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

Audited: ..... Approved for Payment .....

Form 51. (a) Accounts Payable Voucher (inside). (Size, 9 x 8.)

affected are often printed upon the back of the form. While this practice saves time, a better plan is to refer to a list of accounts and symbol numbers when distributing the invoice expenditures. When the account classification runs into hundreds or even thousands, it is obviously impracticable to print their names upon the voucher form.

Minor details worth noting in connection with the operation of voucher forms are, that the certification as to the correctness of the invoice may be stamped upon the voucher instead of the invoice, that spaces for recording the information

ACCOUNTS PAYABLE VOUCHER

Favor of..... No.....

Address..... Date.....

.....

General Ledger Accounts				Factory Ledger Accounts			
Account No.	√	Amount		Account No.	√	Amount	
Total				Total			

Date Paid..... Check No.....

Voucher Register Entry.....

Form 51. (b) Accounts Payable Voucher (outside). (Size, 8 x 9.)

as to the terms of payment may also be provided, and that the purchase requisition, purchase order, and material received report may be attached to the voucher instead of to the invoice. In fact, sometimes the canceled check in payment of the voucher is also attached, or the check may form part of the voucher. Where this is done the term "voucher check" is used.

It will be seen that the voucher gives a complete history of the transactions covered by the invoice, and also provides for a uniform method of filing creditors' invoices. The forms should all be of the same size (about 8 x 9 inches), so that the records when folded will be of convenient size for filing.

The question sometimes arises as to whether a separate voucher should be made out for each invoice, or whether all invoices received from one creditor should be grouped upon one voucher. It depends upon the method of payment. If creditors' accounts are paid monthly, all invoices from the same creditor should be grouped and entered together. If invoices are paid separately, it would obviously be impracticable to postpone the preparation of the voucher until the end of the month. Moreover, the postponement of the work would, in many cases, delay the preparation of the summary records and statements.

Under some conditions of manufacture the pay-roll record may be attached to the accounts payable voucher form. If the pay-roll is in book form, either bound or loose-leaf, reference may be made upon the voucher to the pages or sheet numbers of the pay-rolls and only the analysis need then appear upon the voucher. This eliminates the attaching of numerous records to the voucher, as pay-roll records are often bulky.

In small manufacturing plants it is often practicable to have all charges to factory and expense accounts, as well as many of the charges to the asset accounts, appear upon this

one record. In other words, no charges to expense of any nature or to the factory accounts are entered on the credit side of the cash book for posting to the debit of the various accounts affected. All expenditure items are vouched for entry in the voucher register.

Accounts payable vouchers may be prepared even though a voucher register is not used in connection with these documents, and entered in any kind of a purchase record.

Voucher Register

The voucher register (also termed "Register of Accounts Payable," "Accounts Payable Register," and "Record of Audited Vouchers") is used to summarize and analyze creditors' invoices. (See Form 52.) Though vouchers are usually used in connection with this register, invoices may be used without preparing separate accounts payable vouchers.

The voucher register differs from the purchase record in that it provides additional columns for recording information as to the payment of the invoices. It is a combination of the purchase record and purchase ledger, eliminating the necessity for keeping detailed creditors' accounts. To simplify the discussion of this register, it may be divided into three sections:

1. The descriptive section, giving the date, voucher or invoice number, name of creditor, amount, and in some cases the terms of payment and a description of the goods.
2. The payment section, showing the amount and date of payment, check number, and the name of bank or cash book folio reference.
3. The distribution section, showing the charges to the accounts, columns being headed with the names of those account items which occur frequently during the month. Miscellaneous charges of rare occurrence are entered in a miscellaneous column.

Posting from Voucher Register

Postings from the voucher register are made as follows: The total of the total vouchers payable column is credited to the controlling Accounts Payable account. The totals of the distribution columns, with the exception of the miscellaneous column, are debited to the various accounts affected. The sundry items are debited to the account mentioned in each case.

Where separate factory and general ledgers are kept, care must be taken to maintain the proper control between the two. The totals of the factory ledger account columns should be posted to the controlling factory account in the general ledger if the general ledger controls the factory ledger entries.

Advantages and Disadvantages of Voucher Register

The use of the voucher register has its advantages and its disadvantages. An objection sometimes raised is that, as no creditors' accounts are kept therein, information as to the total amount of purchases from any one creditor cannot be readily obtained. This objection is overcome by keeping a proper index, say on 3 x 5 filing cards, of the names of the creditors, filed alphabetically; on each card would also appear the numbers and dates of creditors' vouchers, recorded when the vouchers are entered in the register. The amount of business done with any creditor during a particular period of time, though not always vital information, is required by many business men for their personal satisfaction and may also be useful at times for the purpose of obtaining rebates, refunds, commissions, special allowances, revised prices on future contracts, and so on. Where this information is essential, the purchase ledger provides it in more convenient form than the voucher register. On the other hand, when the total amount of business is required by kinds of merchandise purchased, the voucher register answers the purpose equally as well, since in both cases references must be made to the invoices.

VOUCHER

For ....

Date	Voucher No.	Name or Details	Vouchers Payable		Payment of Voucher			
			√	Amount	Amount	Check No.	Date	Ref.
		Amounts Forward						
		Amounts Forwarded						

Form 52. (a) Voucher Register (left). (Size, 14 x 11.)

REGISTER

19.....

Distribution of Vouchers																	
Raw Material		Supplies		Factory Expenses		Selling Expenses		Administrative Expenses				Miscellaneous Accounts					
												Account No.	✓	Amount			

Form 52. (b) Voucher Register (right). (Size, 14 x 11.)

Another objection against the voucher register is that it does not provide for information as to allowances or adjustments after the invoices have been entered. This is met by the fact that journal entries showing invoice adjustments may be entered in the payment columns. Where, however, numerous adjusting entries have to be made to certain accounts, it is more convenient to keep purchase ledger accounts with such creditors. As a general rule, in most industries from 75% to 95% of creditors' accounts are paid as per invoice amounts without dispute, and therefore the number of the accounts requiring adjustment is usually small.

A final objection to the use of the voucher register is found in cases where partial payments or payments on account are made. Under these circumstances it is often more practicable to keep a separate purchase record and ledger, unless the accounts settled by partial payments form a small portion of the total number, in which case they may be handled as suggested below.

Combination Voucher Register and Purchase Record

A voucher register may be designed with two total columns, one headed "Voucher Register Items" and the other "Purchase Ledger Items." Those items for which it is necessary to keep detailed creditors' accounts may be entered in the purchase ledger column and the rest in the voucher register column. This method saves time by eliminating many of the postings to creditors' accounts.

Distribution or Analysis Record

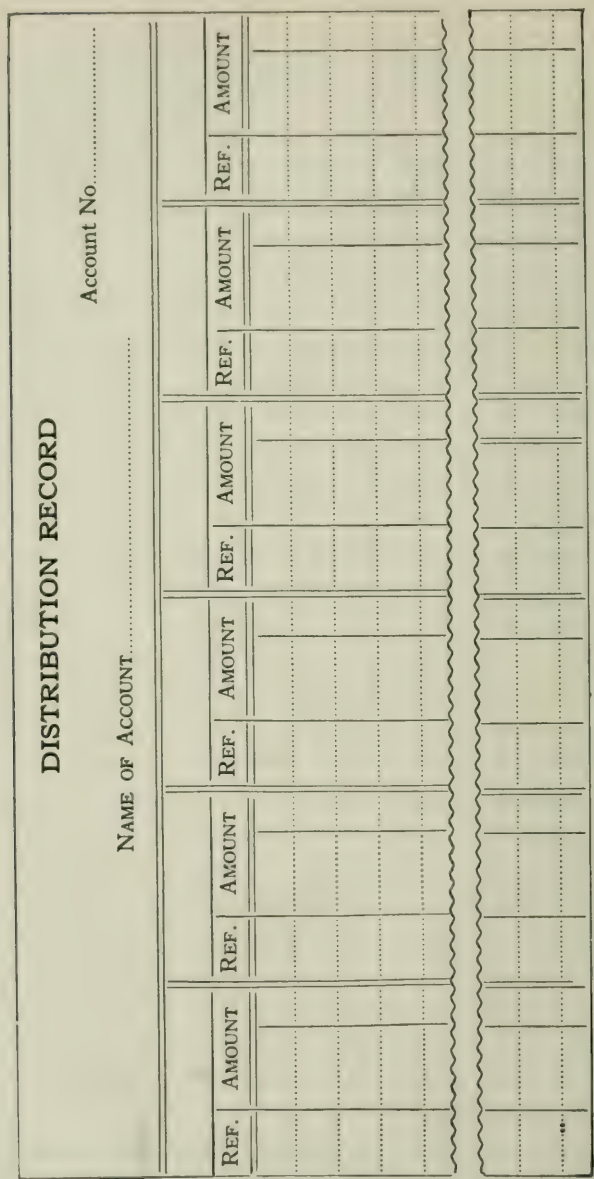
The classifications of the general and the factory ledger accounts are usually so elaborate in manufacturing businesses where a complete cost system is installed, that adequate columnar provision can rarely be made in the purchase record or voucher register for a complete analysis of the various expen-

ditures. If the necessary number of columns were provided to take care of this elaborate analysis, the width of the sheets would make the record so cumbersome and bulky as to be impracticable for everyday use. Therefore, a supplementary record is often necessary for the purpose of classifying the items of expenditures so that postings may be more readily made to the accounts affected.

This supplementary record is known as an "Analysis Record," "Distribution Record," or "Summary Record." (See Form 53.) Its purpose is to support the purchase record or voucher register and permit the proving of the columns of the latter before any postings are made to the ledger. Separate records or sheets may be kept for the analysis of the material charges, overhead expense items, selling expenses, and administrative expenses. Also, if it is necessary to analyze the various expenses affecting different departments, a separate record may be kept for each department.

However, even this method may become cumbersome, due to the number of books or the number of columns necessary to compile the information. If such is the case, the analysis may be made by means of a number of accounts kept on separate cards or sheets, headed with the names of the expenses. The details as to the date of the item posted, reference number, and amount may be entered in the spaces provided for recording this information for each period. In some instances it may be necessary to give a description of each item as well as names and quantities, in which case the distribution record should provide for recording this information. When such a distribution record is kept, the totals of the detailed items are proved with the totals of the various columns in the purchase record or voucher register, this proof being prepared by means of an adding machine.

There are various forms of distribution record, all similar in character to Form 53. The name of the account and the



Form 53. Distrib ution or Analysis Record. (Size, 14 x 11.)

symbol appear at the top of the sheet, and the columns are headed with the months of the year or the definite cost periods. A reference column and an amount column are also provided for summarizing the items affecting the account named in the heading. At the end of the month, after the figures have been proved with those of the purchase record or voucher register, postings may be made directly to the ledger accounts. When a proof is made by means of a listing adding machine, it is well to use this list as a guide to, or a check on, the postings to the ledger accounts.

Form 53 may be developed to provide spaces for a description of the items or for inserting quantities, or any number of changes may be made without destroying the original idea. The sheets should be bound in a loose-leaf binder and classified by account, name, and number in appropriate sections of the binder. Thus, one section may be devoted to material accounts, another to factory expenses, a third to selling expenses, a fourth to administrative expenses, another to miscellaneous charges, and others to factory departments—the number of sections being governed by the various columns in the purchase record or voucher register.

Summary of Material Received

In some cases purchases of material can conveniently be posted to the various stock records affected directly from the invoices or vouchers, supported by the reports of material received. In other cases it is more practicable to summarize the material received and prove this summary with the figures shown by the purchase record or voucher register, together with their supporting documents. Such a summary, known as a "Summary of Material Received," "Report of Material Received," or "Summary of Incoming Materials and Supplies," is prepared from the detailed reports of material received, and if monetary values are necessary, the information

SUMMARY OF MATERIAL RECEIVED

No.............

For.............................. 19......

Report No.	Total Amount	Distribution of Charges								

Form 54. Summary of Material Received. (Size, 14 x 11.)

is obtained from invoices. This record is used where it is necessary to summarize information so as to facilitate postings to the detailed stock records.

The summary of material received (Form 54) is headed with its date and number. The columns show the numbers of the material reports and amounts to be charged to the various accounts, a total column being also provided as a check on the accuracy of the distributed figures entered in the various columns. It may occasionally be necessary to give details as to the names of creditors and a description of the articles purchased, but this information will rarely be needed, as it is given in the detailed reports of material received.

A summary of material received may also be used as an intermediate record for the purpose of compiling the material charges to definite jobs, orders, or articles.

A specialized form of summary of material received is the so-called "Tally Sheet" used in wood-working plants. Such a sheet shows the quantities of the various grades and kinds of lumber received, and thus serves as a check on the invoices. Other special forms for showing the receipt of incoming materials of different kinds are frequently met with, and all of them may be considered as summaries of material received.

Pay-Roll

An analysis of the pay-roll is required for the purpose of compiling the totals of the labor charges to be posted to the ledger accounts affected. In small manufacturing plants the analysis may be made on the pay-roll when the time and labor reports are entered thereon. Where two records are used, the pay-roll may be prepared from the time reports, and the pay-roll analysis from the labor reports, in which case one should check the other.

As the primary purpose of the pay-roll is to ascertain the

PAY-ROLL RECORD

No.....

.....DEPARTMENT

For.....19.....

EMPLOYEE'S NUMBER & NAME		TIME								RATE OF WAGES	AMOUNT OF WAGES	
No.	NAME	MON.	TUES	WED.	THUR	FRI.	SAT.	SUN.	TOTAL			

Form 55. Pay-Roll Record. (Size, 8 x 13.)

wages of employees, the record may be simple in character, showing the employees' numbers, names, and amount of wages for the pay-roll period. The details as to hours of work and production would then appear on the time reports of each individual employee. An elaboration of this record shows the daily time and wages posted in separate columns at the end of each day. On a record kept in this way, the total time of each employee would be ascertained and entered in a total column at the end of the pay-roll period. The day or hourly rate would be shown in a separate column, and after multiplying the total time by this rate, the total amount of wages would be ascertained and entered in a total wages column.

Columns may also be provided for deductions for tools, supplies, advances, or other miscellaneous items which are charged employees, such as fines on account of their work, and so on. The use of such columns necessitates an additional column to show the net amount paid to each employee.

Form 55 is a pay-roll record which may be prepared daily from time reports in the way suggested above.

Where departments are many and employees numerous, separate pay-roll records are usually prepared for each department of the plant, and in some cases the pay day is not the same for all departments, it being more convenient to spread the work of preparing the pay-roll and paying the employees over the week or month. The use of separate departmental pay-roll records often constitutes in itself an analysis, no additional records being required.

Pay-Roll Analysis

A pay-roll analysis (Form 56) is prepared to ascertain the total wages of each department and also the amount of productive labor as separate and distinct from non-productive labor, preparatory to charging these various totals to their proper accounts. Therefore, an analysis of the pay-roll is made to show:

1. The productive labor chargeable to each department.
2. The detailed items composing the non-productive labor.
3. The distribution of the items of non-productive labor to departments.

Complex conditions in large plants often make it impossible to combine the pay-roll analysis with the pay-roll, as a complex analysis may delay the work and thus interfere with the paying of employees. For this reason the analysis is often prepared after the pay day.

In a small plant the pay-roll analysis may be made on the ordinary columnar sheets, bound or in loose-leaf form. But where departments are numerous and the analysis of the pay-roll in consequence is elaborate, columnar sheets are too cumbersome to be satisfactory. In such a case, the analysis may be made on as many sheets as there are labor accounts, in the same manner as an analysis of purchases is made on the distribution records described in this chapter. In fact, the pay-roll analysis may form a part of the distribution record and be kept in a separate section of that record. It should then be balanced and proved with the pay-roll before postings are made to the ledger accounts.

As already mentioned, the pay-roll totals may be entered on the voucher register, being supported by an accounts payable voucher. If this method is used, the detailed items would still have to be distributed so as to compile the charges to the ledger accounts. When employees are numerous this analysis is elaborate, and in that case it would be preferable to make it separately in the distribution record. This procedure, however, is not always necessary, in which case the postings to the accounts affected may be made directly from the voucher register.

Where a separate pay-roll analysis is prepared, the postings to the ledger would be as follows: The figures of the total

PAY-ROLL ANALYSIS

For...19...... No..............................

Employee's No.	Total Wages	Productive Labor					Non-Productive Labor				
		Cutting	Trimming	Sewing	Pressing	Boxing	Cutting	Trimming	Sewing	Pressing	Boxing

Form 56. Pay-Roll Analysis. (Size, 14 x 11.)

column are credited to a Pay-Roll account on the general ledger, while the totals of the distribution columns are debited to the departmental productive labor accounts and indirect expense accounts affected. If a separate distribution record is kept for each account, the postings are made in the same way excepting, of course, that the figures are taken from several sheets instead of a single sheet.

Form 56 represents a pay-roll analysis prepared from labor reports at the end of each pay-roll period.

Where wages are paid weekly, the pay-roll analysis at the end of each week should check with the pay-roll. If the cost period is based on the calendar month, the accrued wages at the end of the month should be added to the totals for the several weeks so that the charges posted to the ledger accounts may include the wages for the entire month.

If both the cost and pay periods are on a monthly basis, no accrued wages need be taken into account when the analysis is prepared at the end of each month. The work may then be simplified by doing part of it daily or weekly as the labor reports are received from departments, so that when the end of the month arrives, there is no big accumulation of reports. This plan of analyzing labor reports at the end of the cost period might have its advantages in a small plant, but if permitted in a large one, the presentation of the financial and factory statements at the end of each cost period might be delayed.

Analysis of Charges to Jobs

Another function of a pay-roll analysis is to show the charges to the various jobs and articles manufactured, thus summarizing the charges to cost sheets and cost records as well as serving the purpose of an accounting summary record. When this procedure is followed, the labor reports, instead of being posted directly to the cost sheets, are entered upon the

pay-roll summary. This provides a proof of the correctness of the total amount of labor charged to jobs, orders, or articles, as this total should equal the total productive labor.

Process Pay-Roll Summary

Under the process method of cost-finding, the labor charges are often analyzed upon a pay-roll summary for the purpose of ascertaining the labor charges to the various processes, the entry being made in total at the end of a cost period to a process cost record or account. This method eliminates the posting of details directly to the process cost record and furnishes a proof of the correctness of the labor charges.

Summary of Salaries

So far, the discussion has dealt with the productive and non-productive wages of factory employees. The salaries paid to the superintendent, foremen, and other supervisors are often entered on a separate pay-roll record, usually because this information is confidential. This record is so simple in character that the analysis of the charges to departments can be readily ascertained. Salaries paid to office employees should also be kept in a separate pay-roll record, as these must be apportioned over the selling and administrative expense accounts and the factory overhead accounts. To sum up, the pay-roll may be analyzed in three sections: (1) productive and non-productive wages; (2) salaries of superintendents, foremen, and supervisors; and (3) salaries of the clerks employed in the selling, administrative, and factory departments.

CHAPTER XVII

COST SUMMARIZING RECORDS—TRANSFERS WITHIN THE FACTORY

Kinds of Records

In every cost system the movement of material and the transfer of labor between departments must be summarized on suitable records, and to accomplish this some or all of the records listed below serve a necessary purpose:

1. Summary of material requisitions.
2. Summary of departmental material used.
3. Summary of stock transfers.
4. Summary of departmental transfers of material.
5. Summary of departmental transfers of labor.
6. Summary of shop order costs.
7. Summary of defective work costs.
8. Summary of factory overhead distribution.
9. Summary of production.

Summary of Material Requisitions

Material requisitions should be summarized to determine the amounts to be credited to the controlling material and supplies accounts, and charged to various departmental material and expense accounts. These charges include direct material and miscellaneous supplies chargeable to factory overhead. Any miscellaneous supplies applicable to the selling and administrative departments should also be shown on the summary.

Where the classification of general and factory accounts is not extensive, a summary of material requisitions may be made upon a columnar-ruled sheet, as in Form 57. Requisitions may be entered on the summary in detail or in daily totals

SUMMARY OF MATERIAL REQUISITIONS

For........................19...... No..........................

Date or Report No.	Total Amount	Distribution of Requisitions								

Form 57. Summary of Material Requisitions. (Size, 14 x 11.)

obtained on an adding machine. The distribution to the accounts should be proved with the amount in the total column.

The summary is usually prepared after the material requisitions have been priced and entered upon the stock records and before postings are made to cost sheets, though the work may be done after postings are made to the cost sheets and other cost records. Requisitions should then be checked to see that none are missing. In some instances it may be necessary to have separate summary columns for credit and charge transactions, especially if there are several stock-rooms, when a separate credit will have to be passed to each stock-room account for the material requisitioned therefrom. Or it may be more practicable to provide separate sheets for credit transactions affecting stock-room accounts and charge transactions affecting departmental material and expense accounts.

Where the classification of the accounts is elaborate, a summary of material requisitions may be prepared upon the distribution sheet (Form 53) already described. A separate sheet would then be used for each account affected both as to credit and charge transactions, the detailed items or the daily totals being entered upon these sheets. The totals should be proved each day and the sum totals ascertained at the end of the cost period. These should be posted to the credit of the stock-room controlling accounts in the factory or general ledger and to the debit of the departmental material and expense accounts. If separate factory and general ledgers are kept, care must be exercised to see that the proper control is established for the transactions which affect each ledger.

All material withdrawn from stock is not necessarily applicable to a definite job, order, or article. Some of it may be stored in the operating department to be used in small quantities as required. Therefore, when summarizing the material withdrawals from stores, it may be necessary to differentiate between material charges applicable to definite jobs or orders,

and material which is being stored in a sub-stock-room or operating department. Under some conditions the material requisitioned for each job is summarized upon separate sheets or cards before an entry is made upon the cost sheet. Where numerous small parts are used in the manufacture of large articles and the requisitions show quantities only, these are first summarized and then priced at their average cost before the cost sheet entry is made.

Summary of Departmental Material Used

The summary of departmental material used is similar to the summary of material requisitions, and the same form may be employed. The consumption of material stored in operating departments is recorded on departmental reports showing its application to jobs. These reports are summarized to ascertain the totals to be credited to departmental material-stock accounts and charged to departmental work-in-proccess accounts.

Summaries of Material Transfers

Where several storerooms are operated, portions of the material are often transferred from one storeroom to another. If such transfers are not recorded upon the regular detailed material requisitions and in that way entered upon the summary of material requisitions, provision must be made for summarizing them on a separate record. This would take the form of a summary of material requisitions, the totals being credited and charged to the stock-room accounts affected.

In the same way, if transfers of material from one operating department to another are numerous, they should be separately recorded on a summary the totals of which are charged or credited to departments receiving or transferring material.

Summary of Departmental Transfers of Labor

Employees may be transferred temporarily from one department to another when orders are rushed or a department is

short-handed. These transfers should be recorded upon detailed labor transfer reports and provision made for summarizing the reports so tha the totals may be credited and charged to the proper departmental labor accounts. Such a summary can be readily prepared on a columnar sheet such as the one used in summarizing material requisitions (Form 57).

The summary should, of course, include only changes of a temporary character. Any permanent transfers should be shown on all necessary records, the employee's number and the position of his name upon the pay-roll being changed.

Summary of Shop Order Costs

Shop order costs for repairs and maintenance should be summarized separately from production costs for the reason that they are an overhead charge to departments. Such summaries are usually prepared from the cost sheets of repair jobs on a standard columnar sheet. If separate costs are not kept for each repair order, the summary may be prepared from standing orders—in either case showing the total material, labor, and overhead charges to overhead accounts and the credits to departmental work-in-process accounts of departments. In small plants a summary of shop order costs may be prepared directly from the detailed material and labor reports instead of from the cost sheets, provision being made for overhead.

Form 58 is used to summarize shop order costs. Each shop order should be entered separately after the costs are ascertained, although where the orders for repairs are numerous, it may be more convenient to enter daily totals obtained by means of an adding machine. The form shows the total material, labor, and overhead costs to be credited to the departments which work upon the orders. If the repairs are all made in one mechanical or millwright department, this department would receive the entire credit for all work done. The

SUMMARY OF SHOP ORDER COSTS

No.....

For.....19.....

Order No.	Credit Dept No.....			Charge Repair & Maintenance Accounts							
	Material	Labor	Overhead	Account No.....	Account No.....	Account No.....	Account No.....	Account No	Account No.....	Account No.....	Account No.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Form 58. Summary of Shop Order Costs. (Size, 14 x 11.)

charges to the repair and maintenance accounts should be proved with the total credits. The postings from this record are made to the ledger accounts shown in the headings.

In small plants it may not be necessary to enter the material, labor, and overhead costs separately, in which case one column only is required for ascertaining the credits. In large plants a separate form may be used for each department, such as the distribution sheets described in the previous chapter.

Summary of Defective Work Costs

A valuable administrative record to present to the management is a summary of costs of defective work, prepared from the cost sheets of this class of production, the totals of which are credited to the department doing the work. Columns provide for charges to the various stock or expense accounts, depending upon the disposition of the defective work. Such a record is handled practically in the same manner as the summary of shop order costs, and may be combined with this summary or that of production, or may be made out separately.

Summary of Factory Overhead Distribution

The department overhead items are obtained from the following cost summaries, already described: (1) purchase records or voucher register, supplemented, when necessary, with analysis sheets; (2) pay-roll or pay-roll analysis; (3) summaries of material requisitions and transfers; (4) summary of departmental transfers of labor; (5) summary of defective work costs; (6) summary of shop order costs.

After gathering the data upon the summaries so far described and posting the figures to the factory accounts, the next step is to prepare a summary of factory overhead distribution for each department. The data for these summaries are taken from factory ledger accounts and distributed thus:

SUMMARY OF FACTORY OVERHEAD

No.....

.....DEPARTMENT

ITEMS OF OVERHEAD	JAN.		FEB.		MAR.		APR.		MAY		JUNE		ETC.	
Indirect Material														
Supplies														
Supervision														
Non-Productive Labor														
Rent														
Insurance														
Taxes														
Light, Heat, Power														
Depreciation														
Repairs														
Sundries														
Total														

Form 59. Summary of Factory Overhead. (Size, 14 x 11.)

1. Items of overhead chargeable to non-productive departments are summarized and distributed.
2. The overhead of each non-productive department is distributed to the productive departments.
3. The items of overhead chargeable to the productive departments are summarized in order to charge the total to departmental work-in-process accounts.

The overhead distribution summaries are usually prepared upon columnar-ruled sheets (Form 59). The items are placed at the left, the form is headed with the months or cost periods, and the totals are charged and credited to the accounts affected. Chapter XX discusses the posting of these items.

Summary of Production

Before designing a form for summarizing the information as to production, consideration must be given to the system in

SUMMARY OF PRODUCTION

.....DEPARTMENT

For.....19.....

No.....

DATE OR REPORT NO.	REMARKS	√	SUMMARY OF COSTS							
			TOTAL		MATERIAL		LABOR		OVERHEAD	

Form 60. Summary of Production (Size, 8 x 11.)

use and to the method of crediting production. The product may be credited to the departmental work-in-process accounts and charged to the various stock accounts, after the work is completed, or as it is finished in one department and transferred to another, to which it is charged.

The summary of production (Form 60) is prepared from the production reports and cost sheets, entries being compiled daily or at the end of the month. If compiled daily, the monthly summary should be on a separate sheet.

Another summary form may be used to record the charges to the stock accounts when production is credited to the work in process accounts, the form consisting of a columnar sheet headed with the names of the stock-room accounts to be charged. The total of all credits, as shown by the summary of production, must be in agreement with this additional record, thus proving the clerical accuracy of the work.

Where there are many departmental work-in-process accounts or numerous stock-room accounts, a separate summary of production may be made, one for each account, the procedure being the same as with the distribution records.

In process cost-finding, a production summary for each or all classes of product is often prepared showing quantities only. Under these circumstances the quantities charged to stock should be proved before the costs are figured. The total costs entered upon each form are charged to a stock account, and the material, labor, and overhead costs are credited to departmental work-in-process accounts. The kind of product, the number of the operating departments, and the method of cost-finding determine the form of a production summary.

A final point is that the cost of equipment or machinery made in the factory should not be included in the regular production. The credits to departmental accounts for this work should be entered upon a separate production summary, and the costs charged to suitable plant asset accounts.

CHAPTER XVIII

COST SUMMARIZING RECORDS—SALES, COST OF SALES, AND JOURNAL ENTRIES

Kinds of Records

Up to this point, consideration has been given to the reports covering the department charges for material, labor, and overhead, and the summaries covering the transfers within the factory. Provision must be made for crediting the factory with the product sold. The necessary steps in this connection entail:

1. Recording and costing the sales.
2. Preparing the sales summary and cost of sales summary.
3. Recording and costing returns.
4. Preparing returns summary and cost of returns summary.
5. Crediting the costs chargeable to the administrative or selling departments.

Shipping Records, Sales Records, and Costing Sales

The shipment of the product after its sale may be covered by the shipping order, which record is often a carbon copy of the factory order. (See Form 61.)

When it is necessary to issue more definite shipping instructions, as for instance when part shipments are made, the back of the form may provide spaces for this information. The shipping record may also be combined with the billing and costing sales record. When this is done, the original copy or customer's invoice, and the second copy which may be the sales record, are usually held in the office until the merchandise is

SHIPPING ORDER

For.....
Address.....
.....

Order No.....
Date.....
Customer's Order No.....

QUANTITY	ARTICLES AND DESCRIPTION
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

Shipped to.....
Via.....
Date Shipped.....
Remarks.....
.....

No. of Packages.....
Shipping Weight.....
Freight Rate.....
Prepaid.....
Collect.....

Form 61. Shipping Order. (Size, 11 x 8)

(*Original*)

THE BROWN MANUFACTURING CO.
New York, N. Y.

Sold to.....
Address.....
Our Order No.....
Shipped Via.....
To be Shipped.....

Date.....

Back Order	Quantity Ordered	Quantity Shipped	Description	Price	Total

Items Not Extended or Short Original Quantity are Back-Ordered and will be Shipped Later

(*Duplicate*)

SALES RECORD

Folio.....
Cr. Acct. No.....
Cr. Acct. No.....
Cr. Acct. No.....
Cr. Acct. No.....
Date.....

Sold to.....
Address.....
Our Order No.....
Shipped Via.....
To be Shipped.....

Back Order	Quantity Ordered	Quantity Shipped	Description	Price	Total

Form 62. (a) Shipping Order Combined with Customer's Invoice, Sales Record, and Cost of Sales Record. (Size, 11 x 8.) (First two columns detachable from original—invoice copy.)

(*Triplicate*)

SHIPPING ORDER AND RECORD

Sold to.....
Address.....
Our Order No.....
Shipped Via.....
To be Shipped.....

Packed by.....
Shipped By.....
Date Shipped.....
Date.....

Back Order	Quantity Ordered	Quantity Shipped	Description	Price	Total

(*Quadruplicate*)

COST OF SALES RECORD

Sold to.....
Address.....
Our Order No.....
Shipped Via.....
To be Shipped.....

Folio.....
Account No.....
Account No.....
Account No.....
Date.....

Back Order	Quantity Shipped	Quantity Shipped	Description	Price	Total

Form 62. (b) Shipping Order Combined with Customer's Invoice, Sales Record, and Cost of Sales Record—*Continued.*

reported shipped on the third copy. If part shipments are made, a note can be placed on the bottom of the invoice stating that all items not extended are on back order and will be shipped at a later date. If the foregoing procedure is followed when the three copies are made, no items should be extended until the merchandise is shipped, and then only for those items. If any remain on back order, a new set of forms should be prepared to cover their shipment, the procedure being the same.

In the handling of the sales record copy, provision may be made for entering thereon the cost of sales unless there is an objection to disclosing the profit. If so, a fourth copy may be prepared and marked "Cost of Sales Record," to be used in costing the items sold.

The above method of combining shipping instructions with customer's invoice, sales record, and cost of sales record is illustrated in Form 62.

Another method of handling confidential cost of sales information is to use an extra detachable column, for recording the cost information upon the sales record. If the sheets are perforated between the sales and the cost of sales columns, the latter can be detached after the cost summaries are obtained and before the sales sheets are placed in a binder or filed in some other suitable way.

Under some circumstances the costing of the sales cannot be combined with the billing and shipping operations, a case in point being where the quantities shipped are classified and summarized and the cost is obtained at the end of the period. When this is the practice, an ordinary columnar sheet headed with the names of the articles, or a separate sheet for each article shipped, is used to summarize the quantity shipped as entered on the detailed sales records. Where quantities are compiled for the purpose of costing sales, the figures should always be proved. Unless this is done, the cost information and statements based thereon may be inaccurate. The infor-

mation as to cost of sales is, of course, obtained from either the cost sheets of special orders, or the stock records if these show cost values. Where standard products are carried in stock, the average costs may be taken directly from the stock records or cost sheets showing cost averages.

In process cost-finding, if cost values are not entered on the finished stock records, provision should be made for costing each lot or shipment. The cost of the same product manufactured at different times would often vary. If the costs of the articles most recently manufactured are not used, or if no check is kept on the cost of each lot shipped, the average cost of the articles produced should be entered as the cost of sales. The finished stock records can generally be used for showing average costs, for the reason that in ascertaining average costs the inventories at the beginning and end of the period must be considered, as well as the production and shipments during previous periods.

Sales Summary

A sales summary (Form 63) usually takes the form of a loose-leaf columnar-ruled sheet unless the sales classifications are so numerous as not to permit the analysis appearing on one sheet. In this case the sheets would be headed with the names of the accounts to be credited, and the total amount of sales would be shown separately. The total of each classification should be credited to an appropriate sales account in the general ledger and the total sales posted to the Accounts Receivable controlling account; or one sales account may be kept in the general ledger, with a supporting record showing the analysis of sales by classes. Customers' invoices may be entered on the sales summary separately or in daily totals compiled by means of an adding machine.

It should be understood that the use of these sales summary records presupposes many kinds of product. Where the

SALES SUMMARY

For.. 19......

No.... ....

Date or Invoice No.	Charge Accounts Receivable	Credit Sales Accounts							
		Account No.....	Account No.....	Account No.....	Account No.....	Account No.....	Account No.....	Account No....	Account No...

Form 63. Sales Summary. (Size, 14 x 11.)

classification is simple, the totals to be credited to the various sales accounts can be ascertained from an ordinary sales book.

Cost of Sales Summary

The cost of sales summary is prepared in the same way as the sales summary, the procedure in classifying the product and ascertaining the totals to be charged to the cost of sales accounts being identical. The total amount should be credited to a finished stock account or Factory Ledger account as kept in the general ledger. Under some conditions quantities only are compiled upon analysis sheets, and the cost of sales summary is prepared as soon as costs are obtained. In either case the cost of sales summary takes the form of a columnar sheet or separate sheets, as the case requires.

Return Credit Records

When merchandise is returned by a customer and credit is sent to him, three copies of the credit memo (Form 64) are made out and used as follows:

1. The original sent to the customer shows that credit has been allowed for the merchandise returned.
2. The second copy is used for posting the credit and as a basis for ascertaining the total credits allowed customers.
3. The third copy serves as a cost of returns record.

Where special allowances are made to customers, credits must also be passed and reports prepared so that this information may be properly recorded. As these items are usually deductions from the sales prices and have nothing to do with costs, they should be separately recorded and not included as part of the returns record. This necessitates two credit records, one for merchandise returned showing both sales and cost values, the other an allowance or sales deduction record.

(*Original*)

THE BROWN MANUFACTURING CO.
New York, N. Y.

CREDIT MEMORANDUM

Credit..... C. M. No.....
Address..... Date.....
.....

QUANTITY	DESCRIPTION	PRICE		AMOUNT	

(*Duplicate*)

OFFICE RECORD COPY

CREDIT MEMORANDUM

Credit..... C. M. No.....
Address..... Date .....
.....

QUANTITY	DESCRIPTION	PRICE		AMOUNT	

Approved..... Charge Account No.....
Summarized..... Charge Account No.....

Form 64. (a) Cost of Returns Record Combined with Customer's Credit Memo and Office Record Memo. (Size, 9 x 6.)

(*Triplicate*)

COST OF RETURNS RECORD

Credit..... C. M. No.....
Address..... Date.....
.....

QUANTITY	DESCRIPTION	COST		TOTAL	
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

Summarized..... Credit Account No.....
Credit Account No.....
Stock Record Entry..... Charge Account No.....
Charge Account No.....

Form 64. (b) Cost of Return Records Combined with Customer's Credit Memo and Office Record Copy.—*Continued.*

Returns Summary and Cost of Returns Summary

The returns summaries—one for the amount of the returns allowed customers and one for the cost of these returns—are prepared in the same way as the summaries of sales and cost of sales. They may take the form of a columnar sheet for all classifications or a separate sheet for each class of product, as already described. By means of these summaries the total of all returns is credited to the customers' controlling returns accounts, and the detailed totals are charged to the sales accounts which have been credited with the merchandise shipped. The cost of the returns is charged to the finished stock accounts, or factory ledger account, total credits being passed to the proper cost of sales account. Allowances are charged to an allowance account if it is not possible to analyze and deduct them from the proper sales account.

Costs and Sales

When it is possible to combine the sales and cost records, including the summaries, this may be done. Such a combined record (Form 65), known as an "Analysis of Sales and Costs" or "Register of Sales and Costs," may be ruled to meet the requirements of each concern, but should provide columns for showing the invoice number, name of customer, amount of sale, cost of sale, and the analysis of the sales and costs by product classifications. If invoices are so numerous as to require entry in daily totals, the invoice number and name of customer columns would be eliminated.

An advantage of this record is that it shows the sales and costs in parallel columns, and therefore it guards against the error of crediting the sales to one account and charging the costs to a different product classification account. When the sales summary is prepared separately from the cost of sales summary, and no check is installed to see that the classification both as to sales and costs is in agreement, it may be found that sales are classified in one way and costs in another. Such errors would result in sales appearing as part of the totals against which no costs are charged, or costs may appear for some product classification against which no sales are credited. Therefore, whenever the sales and cost of sales summaries are prepared separately, a comparison should be made of the original records to see that the name or symbol of the account to be credited or charged is alike for both the sales record and cost of sales record. When detailed analyses are made on extensive forms, errors are apt to occur by inserting items in wrong columns.

Besides receiving credit for the cost of sales, the factory should be credited for the cost of all work which it does for the benefit of the administrative and selling departments. For example, repairs in these departments or miscellaneous supplies of stationery kept in one stock-room for all business require-

REGISTER OF SALES AND COSTS

For...19......

No.................................

Date or Inv. No.	Name of Customer	√	Sales				Cost of Sales			
			Total	Account No.....	Account No.....	Account No.....	Total	Account No.....	Account No.....	Account No.....

Form 65. Register of Sales and Costs. (Size, 14 x 11.)

ments and withdrawn by these departments, should be credited to the factory stock-room accounts and charged to the proper selling and administrative expense accounts. These credits for costs and miscellaneous supplies would be obtained from the summaries previously described, such as production reports and the summary of material requisitions.

Journal Entries

To avoid rewriting a long series of journal entries at the end of each cost period, postings should be made directly from summaries, and, except in rare cases, it should not be necessary to journalize the totals for postings to factory and general ledger accounts. Entries adjusting discrepancies and items of an extraordinary character should, however, be journalized in the usual way. For this purpose, a two-column factory journal may be used and kept distinct from the general journal; or factory ledger columns may be inserted in the general journal for the purpose of recording the information which affects the factory ledger accounts. This is the ordinary type of bookkeeping record and as such requires no further description.

Journal Vouchers and Standing Journal Entries

Instead of a bound book, a journal voucher (Form 66) is sometimes used for the purpose of recording the summaries and adjusting entries. One advantage of this loose-leaf method lies in the fact that journal entries may then be made either in the general office or factory cost office, and after the information is posted to the proper accounts the vouchers can be filed in a loose-leaf binder.

Still another method of handling closing entries is by means of a sheet on which the "Standing Journal Entries," as they are called, are covered for the year. In factory cost accounting, much the same entries are made and the same accounts are affected from period to period, the debits and credits

JOURNAL VOUCHER

No.....

Date.....

NOTE: Explain each entry in space provided below.

Description or Name of Account	Account No.	General Ledger Accounts						Factory Ledger Accounts					
		Dr.		√	Cr.		√	Dr.		√	Cr.		√

Explanation of Entry.....

.....

.....

Prepared by..... Approved.....

Form 66. Journal Voucher. (Size, 11 x 8.)

STANDING JOURNAL ENTRIES

No.....

Explanation..... Date.....

DEBITS

Name of Account	Acct. No.	Jan.	✓	Feb.	✓	Mar.	✓	Apr.	✓	May	✓	June	✓	Etc.	✓
Totals															

CREDITS

Name of Account	Acct. No.	Jan.	✓	Feb.	✓	Mar.	✓	Apr.	✓	May	✓	June	✓	Etc.	✓
Totals															

Form 67. Standing Journal Entries Form. (Size, 14 x 11).

- Cost Summarizing Records
  - Charging Factory Expenditures
    - 1. Material
      - Purchase Invoice and Purchase Record, or Accounts Payable Voucher and Voucher Register
      - Summary of Material Received and Distribution Record
    - 2. Labor
      - Pay-Roll
      - Pay-Roll Analysis
    - 3. Overhead
      - Purchase Invoice and Purchase Records, or Accounts Payable Voucher and Voucher Register, Distribution Record and Pay-Roll Analysis
  - Transfers Within Factory
    - 1. Summary of Material Requisitions
    - 2. Summary of Departmental Material Used
    - 3. Summary of Stock Transfers
    - 4. Summary of Departmental Transfers of Material
    - 5. Summary of Departmental Transfers of Labor
    - 6. Summary of Shop Order Costs
    - 7. Summary of Defective Work Costs
    - 8. Summary of Factory Overhead Distribution
    - 9. Summary of Production
  - Crediting Factory
    - 1. Recording the Sales and Costing the Sales
    - 2. Preparing the Sales Summary and Cost of Sales Summary
    - 3. Recording Returns and Costing Returns
    - 4. Preparing Returns Summary and Cost of Returns Summary
    - 5. Crediting Costs Affecting Administrative and Selling Departments of the Business
  - Journal Entries

Form 68. Chart of Cost Summarizing Records and Procedure

varying only as to amounts. Therefore, a standing journal entry sheet may be used, as shown in Form 67. At the extreme left the names of the accounts or account numbers to be debited or credited appear, and the columns are headed with the months of the year for the purpose of inserting the totals for each cost period. Provision is also made for a posting check.

Besides eliminating the necessity for rewriting the names of the accounts, these standing journal entry forms have other advantages. When all summaries are journalized, the form provides a means of knowing that every entry for the period has been covered. Also, as a comparison of the current transactions with those of the previous months can readily be made, any large discrepancies may be noted before posting to the accounts. Finally, the standing journal form is a valuable aid to the preparation of factory statements, as all the information is arranged in columnar form for each period. Totals can thus be readily obtained or the figures of one period can be compared with those of another.

Chart of Cost Summarizing Records

Form 68 shows in concrete form the cost summarizing records described in this and the preceding chapters. It should be noted that the distribution record, which was discussed in Chapter XVI, may be used for all summary purposes. The sheets of each summary may be classified in sections in a loose-leaf binder, each section being kept separate by means of tab indexes, thus providing a means for ready reference. The folios of each section should be numbered for posting purposes.

Part IV—Controlling the Cost Records

CHAPTER XIX

GENERAL LEDGER CONTROL OF FACTORY ACCOUNTS

The Control of Cost Records

Cost records are controlled by the financial accounts in two ways: Postings are made from the cost summarizing forms described in the preceding chapters, (1) to the general ledger or (2) to factory accounts in a subsidiary factory ledger as well as to certain of the controlling accounts in the general ledger. The different methods of control are explained in this and the following chapter.

To illustrate the general method of controlling the cost records by means of the general accounting records, the following balance sheet is presented as a starting point. It is assumed that the books of the Brown Manufacturing Company show the following financial condition at January 1, 1918:

THE BROWN MANUFACTURING COMPANY
BALANCE SHEET, JANUARY 1, 1918

Assets		*Liabilities*	
Cash	$ 38,000.00	Notes Payable	$ 25,000.00
Accounts Receivable	174,000.00	Accounts Payable	64,000.00
Notes Receivable	20,000.00	Total Liabilities	$ 89,000.00
Merchandise Inventory	226,700.00	Capital Stock	350,000.00
Machinery and Fixtures	35,000.00	Surplus	54,700.00
Total Assets	$493,700.00	Total Liabilities and Capital	$493,700.00

Such a balance sheet may be prepared from the general ledger or private ledger accounts at the end of a fiscal period. The above accounts show the condition as to assets, liabilities, and capital and all appear in the general ledger.

Income and Expense Accounts

Accounts must also be provided to show the details of income and expenses, and would include the following:

1. Sales
2. Merchandise Purchases
3. Productive Labor
4. Factory Indirect Expenses
5. Selling Expenses
6. Administrative Expenses

In order to simplify the discussion, and as the procedure would be the same regardless of the number of accounts, it is assumed that only one account is kept with each of the items listed above. In actual practice, however, there might be several sales accounts to show the amount of sales of the different kinds of product, several accounts showing the different kinds of purchases, the productive labor might not all be recorded in one account, and there would be detailed accounts to record the factory indirect expenses, selling expenses, and administrative expenses.

Assuming the correctness of the foregoing balance sheet on January 1, 1918, the first entries, indicated by the figure (1) in the illustrative accounts appearing on pages 296-298, are those made to record the balances upon the ledger accounts.

Purchase Transactions

The purchases are entered from the invoices or from the accounts payable vouchers to a purchase record or voucher register. Assume that at the end of the cost period this record shows total purchases of $65,000, represented by:

Purchases of Material	$59,000.00
Invoices chargeable to Indirect Expense Accounts	2,500.00
Invoices chargeable to Selling Expense	1,500.00
Invoices chargeable to Administrative Expense	2,000.00

These items would be posted to the various accounts affected, constituting entries (2) in the illustrative accounts which follow.

Pay-Roll and Analysis

Information as to salaries and wages paid would be obtained either from the cash record supported by the pay-roll analysis, or from the voucher register if the pay-roll were entered in that record. In the case under consideration, the pay days are assumed to be on the fifteenth and at the end of the month, and the pay-roll analysis shows that salaries and wages amount to $28,300, made up as follows:

Productive Labor	$18,000.00
Non-Productive Labor, including supervision	4,500.00
Salesmen's Salaries	4,300.00
Administrative Office Salaries	1,500.00

The postings of pay-roll items to their respective accounts constitute entries (3) and represent the current charges for labor and various items of overhead. Thus the postings obtained from the summaries or analyses of the purchases and the analysis of the pay-roll represent the current factory expenditures.

Sales Transactions

Assuming that the total shipments during the period are entered on one sales record, and that their amount is $85,000 for the period, entries (4) would be made charging Accounts Receivable and crediting Sales account with this amount.

Cash Transactions

Assume that the cash receipts are $105,000 and cash payments $103,300 as shown by the cash book, and that these totals are made up as follows:

Receipts from Customers	$100,000.00
Notes Receivable	5,000.00
Paid on account of Notes Outstanding	10,000.00
Paid to various Creditors	65,000.00
Paid on account of Pay-Roll during the month	28,300.00

This information is sufficient for making entries (5) and (6), entry (5) being for cash receipts and (6) for cash payments.

The discounts received, discounts allowed, interest transactions, and deferred items of expense are omitted from consideration. The entries so far given represent the usual transactions which need to be summarized at the end of the period, any unusual transactions requiring adjusting journal entries not being considered.

Ledger Accounts

After posting these items to the ledger, the accounts would appear on that record as follows:

CASH

Jan. 1 Balance	(1) $38,000	Jan. 31 Sund. Pay'ts.	(6) $103,300
31 Sund. Recpts.	(5) 105,000		

ACCOUNTS RECEIVABLE

Jan. 1 Balance	(1) $174,000	Jan. 31 Cash	(5) $100,000
31 Sales	(4) 85,000		

NOTES RECEIVABLE

Jan. 1 Balance	(1) $20,000	Jan. 31 Cash	(5) $5,000

MERCHANDISE INVENTORY

Jan. 1 Balance	(1) $226,700		

MACHINERY AND FIXTURES

Jan. 1 Balance	(1) $35,000		

Notes Payable

Jan. 31 Cash .....(6) $10,000	Jan. 1 Balance .....(1) $25,000

Accounts Payable

Jan. 31 Cash .....(6) $65,000	Jan. 1 Balance .....(1) $64,000 31 Purchases ...(2) 65,000

Pay-Roll Account

Jan. 31 Cash .....(6) $28,300	Jan. 31 Sal. & Wages (3) $28,300

Capital Stock

	Jan. 1 Balance .....(1)$350,000

Surplus

	Jan. 1 Balance .....(1) $54,700

Sales

	Jan. 31 Accts. Rec...(4) $85,000

Merchandise Purchases

Jan. 31 Purchases ..(2) $59,000	

Productive Labor

Jan. 31 Cash .....(3) $18,000	

Factory Indirect Expenses

Jan. 31 Purchases ...(2) $2,500 31 Cash—Non-Prod. Labor..(3) 4,500	

Selling Expenses

Jan. 31 Purchases ...(2) $1,500 31 Cash—Sal. ..(3) 4,300	

ADMINISTRATIVE EXPENSES

Jan. 31	Purchases ...	(2)	$2,000
31	Cash—Sal. ..	(3)	1,500

A trial balance prepared from the above ledger accounts at the end of the cost period would appear as follows:

THE BROWN MANUFACTURING COMPANY
GENERAL LEDGER TRIAL BALANCE
JANUARY 31, 1918

1	Cash	$ 39,700.00	
2	Accounts Receivable	159,000.00	
3	Notes Receivable	15,000.00	
4	Merchandise Inventory (balance, January 1)	226,700.00	
5	Machinery and Fixtures	35,000.00	
6	Notes Payable		$ 15,000.00
7	Accounts Payable		64,000.00
8	Pay-Roll		.....
9	Capital Stock		350,000.00
10	Surplus		54,700.00
11	Sales		85,000.00
12	Merchandise Purchases	59,000.00	
13	Productive Labor	18,000.00	
14	Factory Indirect Expense	7,000.00	
15	Selling Expenses	5,800.00	
16	Administrative Expenses	3,500.00	
		$568,700.00	$568,700.00

Merchandise Inventory

The above accounts show the condition of the assets, liabilities, capital, and surplus, and the transactions affecting the items of income and expenses for the period. The charges for material, labor, and overhead have been made. But as the trial balance does not include the figures as to the value of the closing inventory, the cost of sales for the period cannot be ascertained, and neither a balance sheet nor a profit and loss statement can be prepared. If the factory cost of the sales

of $85,000 were determined, the inventory, material, labor, and overhead accounts could be credited with the cost of sales and thus furnish a basis for ascertaining the value of the merchandise inventory. Therefore, it should be noted that the preparation of financial statements is contingent upon this valuation and that their accuracy depends upon the accuracy of the method of obtaining the inventory.

There are two ways of ascertaining the value of the merchandise inventory. The first method is to make a physical count of the items of merchandise on hand, price them at cost and add the extensions. This method is rarely resorted to, excepting at the close of the fiscal year, because of the clerical work involved.

The second method is to compute the total cost of the sales for the period, and with these figures as a basis, the value of the merchandise inventory may be calculated as follows:

To the opening merchandise inventory should be added the amounts of the merchandise purchases, productive labor, and overhead cost for the period, from which sum is deducted the amount of the cost of sales. This leaves a balance which represents the value of the merchandise inventory at the close of the period. In other words, the factory is charged with the opening inventory and all material, labor, and overhead items, and receives credit for the cost of the work done, that is, the cost of the sales or shipments made during the period. The result would necessarily be the balance of merchandise on hand, to be accounted for.

Even in large manufacturing plants provision is not always made for the keeping of a perpetual inventory. As the merchandise on hand often represents one of the largest of the assets, the importance of an accurate inventory needs to be emphasized. An inventory taken inaccurately would affect the profits and may affect the compensation of members of the

organization. Therefore, it is important in every system of cost accounts that a check be established upon the movements of the merchandise inventory.

Controlling Factory Transactions—First Method

So far the discussion has covered the material, labor, overhead, and production reports, and the summarizing cost records required to ascertain the total charges and credits affecting the various accounts. The method of controlling the detailed reports and summary records so that the figures contained therein may be interlocked with the transactions recorded upon the financial books may now be considered.

The simplest means of controlling factory cost books is to keep the factory controlling accounts on the general ledger and provide for recording therein the credit for the cost of factory production. To accomplish this, two additional accounts are opened: (1) Factory Production account, which is credited, and (2) Cost of Sales account, which is debited with the value of the shipments made during the period.

Under simple manufacturing conditions the cost of the sales might be debited to the Sales account, if the latter did not contain any other transactions. But if returns and allowances are also debited to the Sales account, the account would have to be analyzed before the proper information as to the sales and cost of sales could be ascertained. This analysis would also be necessary if the Sales account were credited with any adjustments in sales prices and cost of returns. Therefore, it is, as a rule, preferable to keep a separate Cost of Sales account rather than to have the cost transactions appear in the Sales account.

To return to the consideration of the trial balance given above, it is assumed that the factory cost of the sales ($85,000) is $60,000, which amount is debited to Cost of Sales account and credited to Factory Production account. The addition

of these two accounts to the foregoing trial balance, as shown below, gives all the information required to compute the value of the closing inventory and prepare financial statements:

THE BROWN MANUFACTURING COMPANY

GENERAL LEDGER TRIAL BALANCE

January 31, 1918

1	Cash	$ 39,700.00	
2	Accounts Receivable	159,000.00	
3	Notes Receivable	15,000.00	
4	Merchandise Inventory, January 1, 1918	226,700.00	
5	Machinery and Fixtures	35,000.00	
6	Notes Payable		$ 15,000.00
7	Accounts Payable		64,000.00
8	Pay-Roll		.....
9	Capital Stock		350,000.00
10	Surplus		54,700.00
11	Sales		85,000.00
12	Merchandise Purchases	59,000.00	
13	Productive Labor	18,000.00	
14	Factory Indirect Expenses	7,000.00	
15	Selling Expenses	5,800.00	
16	Administrative Expenses	3,500.00	
17	Factory Production		60,000.00
18	Cost of Sales	60,000.00	
		$628,700.00	$628,700.00

The inventory at January 31 is ascertained in the following manner:

Merchandise Inventory, January 1, 1918		$226,700.00
Factory Charges:		
Merchandise Purchases	$ 59,000.00	
Productive Labor	18,000.00	
Factory Indirect Expenses	7,000.00	
Total Factory Charges		84,000.00
Total Merchandise Inventory and Factory Charges		$310,700.00
Factory Production (at cost)		60,000.00
Merchandise Inventory, January 31, 1918		$250,700.00

A balance sheet and a manufacturing and profit and loss statement prepared at the end of January would appear thus:

THE BROWN MANUFACTURING COMPANY

BALANCE SHEET, JANUARY 31, 1918

Assets		*Liabilities*	
Cash	$ 39,700.00	Notes Payable	$ 15,000.00
Accounts Receivable	159,000.00	Accounts Payable	64,000.00
Notes Receivable	15,000.00		
Merchandise Inventory	250,700.00	Total Liabilities	$ 79,000.00
Machinery and Fixtures	35,000.00	Capital Stock	350,000.00
		Surplus	54,700.00
		Net Profit for January	15,700.00
Total Assets	$499,400.00	Total Liabilities and Capital	$499,400.00

THE BROWN MANUFACTURING COMPANY

MANUFACTURING AND PROFIT AND LOSS STATEMENT

For the month of January, 1918

Sales		$85,000.00
Cost of Sales:		
Merchandise Inventory, January 1, 1918	$226,700.00	
Merchandise Purchases	59,000.00	
Productive Labor	18,000.00	
Factory Indirect Expenses	7,000.00	
Total Charges	$310,700.00	
Less Merchandise Inventory, January 31, 1918	250,700.00	
Total Cost of Sales		60,000.00
Gross Profit		$25,000.00
Expenses:		
Selling Expenses	$ 5,800.00	
Administrative Expenses	3,500.00	
Total Expenses		9,300.00
Net Profit		$15,700.00

Controlling Factory Transactions—Second Method

If the amount of a merchandise inventory is small, it may be sufficient to use the method of control described in this chapter. However, in most cases the inventory constitutes an asset item of sufficient importance to require a check or test of its valuation to be made in detail. This is affected by dividing the inventory into its three natural divisions and opening a controlling account with each on the general ledger. These three divisions are:

1. Raw Material account
2. Work in Process account
3. Finished Stock account

The Raw Material account is debited with the value of the opening inventory and the purchases during the period, and credited with the current withdrawals for manufacturing purposes.

The Work in Process account is debited with: (1) the value of the work in process at the beginning of the period as recorded on the uncompleted cost sheets; (2) the material charges credited to Raw Material account; (3) the charges for the current productive labor; and (4) the total factory overhead of the operating departments. It is credited with the cost of the articles manufactured and transferred to finished stock.

The Finished Stock account is debited with the cost of the articles manufactured and taken into stock, and credited with the shipments made during the period.

Thus the balances of the three above accounts represent the raw material, work in process, and finished stock inventories and take the place of the four accounts: Merchandise Inventory, Merchandise Purchases, Productive Labor, and Factory Production accounts. To illustrate the method of controlling factory transactions, when the merchandise inven-

tory is analyzed as above it is assumed that the amount of $226,700 as previously shown is analyzed into:

Raw Material	$65,200.00
Work in Process	32,200.00
Finished Stock	129,300.00
	$226,700.00

This analysis, which may be made from the current inventory sheets, provides the information for starting the three controlling accounts illustrated below with entries designated by the figure (1). Thus, instead of the total amount of merchandise inventory appearing in one account, it is divided so as to provide classified charges.

The source of the remaining entries to the three accounts may be recapitulated: The purchases of raw material—entry (2)—are obtained from the source already described. The value of the raw material used in manufacture—entry (3)—is obtained from the summary of material requisitions for the period. The current productive labor charged to the Work in Process account—entry (4)—is taken from the payroll analysis. This entry, it should be noted, includes only part of the wages paid, the non-productive wages and salaries being debited to the expense accounts, while the total amount of all salaries and wages is credited to Pay-Roll account in the same manner as that previously described.

The factory overhead, as already explained, is compiled in separate expense accounts which are closed out to Factory Indirect Expense account. This account in its turn is closed out to Work in Process account—entry (5).

After the manufacturing departments have been charged, through the Work in Process account, with the various items of material, labor, and overhead, provision must be made for recording the production of these departments. To this end the detailed production reports which show the articles manu-

factured are summarized so as to furnish the total cost of production. Assuming that the total cost of production as reported on a production summary is $40,000, postings are made as shown in entry (6).

Under the method previously described, the cost of sales is shown to be $60,000, which amount is credited to Factory Production and debited to Cost of Sales account. When the accounts are classified for the purpose of analyzing the merchandise inventory, the cost of sales should be credited to Finished Stock instead of Factory Production account, the debit entry being the same—to Cost of Sales account. This information is posted directly from a cost of sales summary and furnishes the basis for recording entry (7).

After the postings have been made under this method of control, the Raw Material, Work in Process, and Finished Stock accounts would appear upon the ledger as follows:

RAW MATERIAL

1918			1918		
Jan. 1 Balance	(1)	$65,200	Jan. 31 Mat'l Req.	(3)	$28,000
31 Purchases	(2)	59,000			

WORK IN PROCESS

1918			1918		
Jan. 1 Balance	(1)	$32,200	Jan. 31 Production	(6)	$40,000
31 Material	(3)	28,000			
31 Prod. Labor	(4)	18,000			
31 Fac. Ind. Ex.	(5)	7,000			

FINISHED STOCK

1918			1918		
Jan. 1 Balance	(1)	$129,300	Jan. 31 Cost of Sales	(7)	$60,000
31 Production	(6)	40,000			

A trial balance of the ledger prepared from the accounts would now read as follows:

THE BROWN MANUFACTURING COMPANY
GENERAL LEDGER TRIAL BALANCE
January 31, 1918

1	Cash	$ 39,700.00	
2	Accounts Receivable	159,000.00	
3	Notes Receivable	15,000.00	
5	Machinery and Fixtures	35,000.00	
6	Notes Payable		$ 15,000.00
7	Accounts Payable		64,000.00
9	Capital Stock		350,000.00
10	Surplus		54,700.00
11	Sales		85,000.00
15	Selling Expenses	5,800.00	
16	Administrative Expenses	3,500.00	
18	Cost of Sales	60,000.00	
19	Raw Material	96,200.00	
20	Work in Process	45,200.00	
21	Finished Stock	109,300.00	
		$568,700.00	$568,700.00

When the inventories are divided into raw material, work in process, and finished goods, and separate accounts are kept with each on the general ledger, the constituent parts of the inventory are recorded among the assets on the balance sheet. The balance sheet and profit and loss statement may be prepared from the trial balance practically in the same manner as the statements under the first method; the same procedure is also followed in recording the summarized transactions. This is the simplest method of controlling the cost records, as the factory controlling accounts themselves become a part of the financial system of accounts.

Proving the Inventory Balances

The reliability of the inventory balances as shown by the controlling Raw Material, Work in Process, and Finished Stock accounts depends to a large extent upon the accuracy of the clerical work done and the means of proving or testing the figures. The general ledger Raw Material account con-

trols the raw material ledger accounts; therefore the total of their balances should be in agreement with the balance shown by the controlling account and should represent the amount of material and supplies on hand in the various storerooms of the plant.

In like manner, the general ledger Work in Process account (also termed "Manufacturing" account, "Process" account, and "Operating" account) controls the charges to jobs or orders in the course of manufacture. Therefore its balance should equal the total of all charges entered in detail on the uncompleted cost sheets.

The general ledger Finished Stock account controls the finished stock ledger accounts; therefore their total balances should be in agreement with the balance of the general ledger account and should represent the actual quantity of finished stock on hand.

A perfect system of controlling the accuracy of the merchandise inventory may be installed, yet the figures may not agree with the actual facts as shown by the amount of the merchandise in the storerooms and operating departments. Therefore it is necessary to test the accuracy of the balances of the detailed records, by verifying them with the actual quantities of merchandise on hand.

Subdivisions of Controlling Accounts

Where large quantities of different kinds of raw material are kept in the same or separate storerooms, a controlling account may be kept with each kind of raw material or with each storeroom. For example, there might be a raw material account for steel parts, another for paints and varnishes, and another for miscellaneous materials and supplies, in which cases the detailed records would be kept in separate ledgers allotted to each classification.

The Work in Process account might be expanded into

separate accounts for each operating department—as in a garment factory where the manufacturing cost of the cutting, trimming, sewing, and inspecting departments may be separately recorded. This subdivision of the control may be carried to the point of keeping a separate account for each contract. Where this is done, all details of the material, labor, and overhead costs are posted directly to a separate ledger Work in Process account headed with the name of the contract or a contract number.

The finished stock may be controlled by means of several accounts so as to show the cost of the various kinds of product manufactured. In such a case the account classification is generally determined by the method of classifying the sales.

Controlling Factory Transactions—Third Method

Where the main or general office is far removed from the factory, or when the large amount of capital tied up in the inventories makes it desirable to control each major classification of the stock on hand separately, the foregoing method of control proves inconvenient because of the amount of detail to be entered on the general ledger. This interferes to a large extent with keeping the postings up to date and makes the financial records cumbersome and bulky. Therefore, with a view to simplifying the method of control, the inventory controlling accounts are often kept in the factory ledger, which in its turn is controlled by a single account kept on the general ledger in the main or general office.

Factory Ledger Controlling Account in the General Ledger

The single controlling account opened on the general ledger is termed "Factory Ledger" account or "Factory" account, for the reason that it shows on one side the total factory expenditures and on the other the cost of the finished goods for the period. The difference between the two, i.e.,

the balance of the account, represents the value of the merchandise inventories on hand.

The Factory Ledger controlling account is charged with:

1. Merchandise on hand at the beginning of the period, as shown by the inventory record.
2. The total amount of material purchased, as shown by the purchase record or voucher register.
3. The total amount of salaries and wages paid for productive and non-productive labor as shown by the pay-roll analysis.
4. The total amount of factory indirect expenses, as shown by the purchase or voucher record, fixed schedules, and other analysis records of factory expenses.

The Factory Ledger controlling account is credited with:

1. The total cost of shipments.
2. The total cost of work done by the factory, chargeable against selling or administrative expenses.

Using the entries and figures given on 296-298, and constructing a factory ledger controlling account therefrom, the result would be as follows:

FACTORY LEDGER CONTROLLING ACCOUNT

Jan.	1	M'dise Inventory	$226,700	Jan. 31 Cost of Sales....	$60,000
	31	M'dise Purchased	59,000		
	31	Prod. Labor.....	18,000		
	31	Non-Prod. Labor	4,500		
	31	Indirect Labor..	2,500		

Thus the above account replaces the Raw Material, Work in Process, and Finished Stock accounts, which are then kept in any desired detail in the factory ledger. After all information is posted to the accounts, a trial balance prepared from the general ledger would appear as follows:

THE BROWN MANUFACTURING COMPANY

GENERAL LEDGER TRIAL BALANCE

January 31, 1918

1	Cash	$ 39,700.00	
2	Accounts Receivable	159,000.00	
3	Notes Receivable	15,000.00	
5	Machinery and Fixtures	35,000.00	
6	Notes Payable		$ 15,000.00
7	Accounts Payable		64,000.00
9	Capital Stock		350,000.00
10	Surplus		54,700.00
11	Sales		85,000.00
15	Selling Expenses	5,800.00	
16	Administrative Expenses	3,500.00	
18	Cost of Sales Account	60,000.00	
22	Factory Ledger Account	250,700.00	
		$568,700.00	$568,700.00

A balance sheet and a manufacturing profit and loss statement may be prepared from this trial balance and the supporting ledger accounts without waiting to see whether the detailed accounts are in agreement with the balance as shown by the Factory Ledger controlling account.

Classification Chart of General Ledger Accounts

In large manufacturing concerns it is customary to provide a chart or a classified list of accounts showing the exact name of each and the transactions to be recorded therein. Where the classification is elaborate, it is well to use account numbers or symbols so as to facilitate ready reference to them and thus save the bookkeepers' time. Such a chart should be printed upon heavy paper or cardboard and hung in view of those who have occasion to refer to it frequently. Where desks are equipped with glass tops and the chart is inserted under the glass, reference can be made to it very readily.

The requirements of each concern govern the number of copies of the chart of accounts to be prepared and the mem-

bers of the staff to whom they are to be given. Ordinarily it is necessary for each clerk in the accounting and cost departments to have his own copy, while an additional copy should be given to the purchasing agent and treasurer or the officer who is in charge of the accounting records. Portions of the chart of accounts may be given to the plant superintendent, production manager, factory foreman, stock clerks, and factory clerks.

The chart shown in Form 69 gives a classified list of accounts of a large manufacturing concern.

Arrangement of General Ledger Accounts

The order in which accounts appear in the general ledger depends upon their number and the kind of ledger in use—whether a bound book or loose-leaf in form. If the accounts are not numerous, it is well to arrange them in the order in which they appear in the financial statements so as to facilitate the preparation of the latter at the end of each cost period. A suggested order of arrangement for the various classes of accounts is:

1. Asset accounts
2. Liability accounts
3. Capital accounts
4. Income accounts
5. Cost of sales accounts
6. Selling expense accounts
7. Administrative expense accounts

If a loose-leaf ledger is kept, the accounts may be classified by tab indexes so as to show each of the above classifications under a separate tab. Where an elaborate classification of accounts is made, they are often arranged in loose-leaf ledgers according to the symbol references.

When accounts are numerous, those of a like nature are

ASSET, LIABILITY, AND CAPITAL ACCOUNTS

Name of Account	No.
Assets:	
Petty Cash Fund	1
First National Bank	2
City Trust Company	3
Salesmen's Cash Funds	6
Branch Office Cash Funds	8
Accounts Receivable A-K	10
Accounts Receivable L-Z	11
Suspended Accts. Receivable	14
Personal Accts. Receivable	15
Notes Receivable	18
Factory Ledger Account	20
Real Estate—Land	25
Real Estate—Buildings	26
Factory Machinery and Equipment	27
Factory Small Tools	28
Office Equipment	29
Deferred Charges	35

Name of Account	No.
Liabilities:	
Notes Payable	50
Accounts Payable	51
Personal Loans	52
Accrued Salaries and Wages	53
Accrued Interest	54
Accrued Taxes	55
Mortgage	60
Reserves:	
Depreciation—Buildings	65
Depreciation—Machinery and Equipment	66
Depreciation—Small Tools	67
Depreciation—Office Equipment	68
Doubtful Accounts	69
Capital Stock:	
Preferred Issue	75
Common Issue	76
Surplus	80

SALES, COST OF SALES, AND INCOME ACCOUNT

Name of Account	No.
Sales:	
Gowns	90
Dresses	91
Suits	92
Cloaks	93
Waists	94
Deductions from Sales:	
Allowances—Gowns	100
Allowances—Dresses	101
Allowances—Suits	102
Allowances—Cloaks	103
Allowances—Waists	104

Name of Account	No.
Cost of Sales:	
Gowns	110
Dresses	111
Suits	112
Cloaks	113
Waists	114
Miscellaneous Income:	
Interest Earned	120
Discount Earned	121
Miscellaneous Items	122
Deductions from Income:	
Interest Allowed	130
Discount Allowed	131
Miscellaneous Items	132

Form 69. Classification Chart

SHIPPING AND SELLING EXPENSES

Name of Account	No.
Shipping Expenses:	
Salaries—Supervision	140
Wages	141
Rent	142
Packing Supplies	143
Repairs	144
Depreciation	145
Liability Insurance	146
Light, Heat and Power	147
Teaming and Cartage	148
Miscellaneous Expenses	149

Name of Account	No.
Selling Expenses:	
Salesmen's Salaries	160
Salesmen's Commissions	161
Salesmen's Expenses	162
Advertising	163
Rent	164
Printing and Stationery	165
Postage	166
Office Supplies	167
Repairs	168
Depreciation	169
Light and Heat	170
Samples	171
Telephone and Telegraph	172
Conventions	173
Miscellaneous Expenses	174

ADMINISTRATIVE EXPENSES

Name of Account	No.
Executive Salaries	180
Office Clerks' Salaries	181
Executive Expenses	182
Rent	183
Printing and Stationery	184
Postage	185
Office Supplies	186
Repairs	187
Depreciation	188
Light and Heat	189
Telephone and Telegraph	190
Charity and Donations	191
Mercantile Agencies	192
Association Dues	193
Collection Expenses	194
Legal Expenses	195
Auditing Expenses	196
Miscellaneous Expenses	197

of General Ledger Accounts

sometimes grouped and supported by subsidiary ledgers or analysis records. For example, one sales account may show total transactions and be supported by an analytical sales record of the product classifications. The total net sales of each class could be ascertained by reference to this detailed subsidiary record. In like manner, instead of several cost of sales accounts, one cost of sales account may be supported by an analysis record showing the cost of sales for each classification in detail. Selling and administrative expenses may be treated in the same way. However, in the majority of cases, it is simpler to keep detailed general ledger accounts with each item rather than separate subsidiary analysis records.

The operation of the ledger accounts shown in the chart on pages 312, 313 is not described in this volume as the subject of general accounting is beyond the present scope. The principles of double-entry bookkeeping and general accounting should be thoroughly understood by anyone who attempts to operate a cost accounting system and provide for the method of interlocking the cost accounts with the financial accounts.

CHAPTER XX

FACTORY LEDGER CONTROLLING ACCOUNTS

Methods of Keeping the Factory Ledger

In developing the method of controlling factory costs, it has been noted that under some conditions it is more practicable to keep a separate factory ledger—variously termed "Manufacturing Ledger," "Cost Ledger," "Cost Department Ledger," or "Factory Ledger." This record, which controls the detailed cost compilations of material, labor, and overhead, is usually controlled in its turn, as already stated, by a single general ledger account which forms part of the financial accounting system.

There are two methods of keeping the subsidiary factory ledger. Under the first method it is not self-balancing; under the second method it is self-balancing. That is, in the former instance, the balance of the Factory Ledger controlling account in the general ledger must be obtained before it is known whether or not the factory ledger accounts are correct, while in the latter instance, the mathematical accuracy of the entries can be proved without referring to the general ledger controlling account. When the second or self-balancing method is used, a "General Ledger" account is kept in the factory ledger. Under both methods the factory ledger accounts are usually divided into the classifications of:

1. Raw material accounts
2. Work in process accounts
3. Part-finished stock accounts
4. Finished stock accounts
5. Labor accounts
6. Factory indirect expense accounts

Factory Journal

To facilitate postings to the factory ledger accounts, a factory journal or journal vouchers may be used in the manner described in Chapter XVIII. If the journal is employed for adjusting entries only, a regular two-column book will serve this simple purpose. It should be remembered, however, that the use of a factory journal is often a duplication of clerical work, as postings may be made directly to the ledger accounts from the detailed cost summaries.

Raw Material Accounts

One or several raw material accounts may control the items of direct material and supplies classified on the stores ledger either by kinds or by location. The number of accounts and storerooms operated will obviously depend upon the requirements in each case. Whatever their number, they should provide for the proper test of the detailed items of raw material composing the merchandise inventory.

In the problem given in the preceding chapter, the inventory of raw material on hand at January 31, 1918, is $96,200. If only one controlling account were kept, and it was found that the total of the stores ledger balances did not agree with the balance of the raw material controlling account, the detail postings would have to be verified before the discrepancy could be located. But if the stores items were divided into several classifications and separate accounts were kept for each, errors in postings would more readily be located. In determining the classifications of raw material the question to be considered is the need of checking the consumption and valuation of different kinds of stores. Raw material may be stored in several storerooms, and in order to fix responsibility upon the stores-keeper in charge, it may be necessary to control each storeroom separately.

Under certain conditions the value of the raw material

used in the manufacture of different products may vary widely. It is important to charge any discrepancies in the raw material stores to the correct product classification, otherwise a product with a low material cost would be charged with more than its proper proportion. This is particularly essential in cases where the compensation of certain members of the organization depends to some extent upon the profits resulting from the sale of certain products.

Postings to Raw Material Accounts

The method of posting the transactions to several raw material accounts is the same as the method of posting to one account, excepting that additional entries may be required to record any stock transfers between storerooms. The debits and credits and the source of the figures in each case are enumerated below.

The raw materials accounts are debited with:

1. The amount of inventory on hand at the beginning of the period.
2. The total amount of raw material purchased, as shown by the purchase records or voucher register, together with the supporting invoices or accounts payable vouchers and reports of material received. Merchandise returned to the creditors should be treated as deductions from the purchases.
3. The total amount of stock transfers during period.

The raw materials accounts are credited with:

1. The total amount of material issued from stock as shown by the summary of material requisitions. Material which is returned to stores should be treated as deductions from amount requisitioned.
2. The total amount of stock transfers during the period.

Any adjusting entries to bring the controlling accounts in agreement with the subsidiary stores ledger or the raw material inventory should be made in the journal and posted to the accounts. Obsolete raw material and supplies—which, as already stated, are usually kept in a separate part of the storeroom—should be controlled separately.

Work in Process Accounts

The work in process account, or accounts, control the cost sheets of either the jobs, orders, or articles in the course of manufacture, or the various processes through which the product passes. Work in process accounts may be kept in three different ways, as follows:

1. One account may control all the work in process.
2. Separate accounts may control each operating department.
3. Separate accounts may control each job or factory order issued, or each process or each machine.

Where both special and standard products are manufactured, it is well to keep the work in process accounts separately in each case if it is practicable to do so. If the operating departments of the plant can be so organized that the special product is handled by special employees, this distinctive control of the two classes of product may be easily effected.

The advantages of keeping several work in process accounts in place of one controlling account are three in number:

1. Discrepancies are more easily noted.
2. A test of the inventory value of the work in process is more easily made and discrepancies can be adjusted more readily.
3. If it is necessary to adjust discrepancies in the cost of work in process due to unlocated differences, several accounts provide more satisfactory means

of making the necessary corrections. Adjustments can then be made upon the one account without affecting the other accounts.

Postings to Work in Process Accounts

The method of keeping the work in process accounts is practically the same for one or several accounts, and in all cases includes the entries below.

The work in process accounts are debited with:

1. The cost value of the inventory of work in process on hand at the beginning of the period.
2. The direct material received from stores as shown by the summary of material requisitions after deducting material returned to stores.
3. The direct labor for the period as shown by the payroll analysis.
4. The total amount of departmental factory overhead as shown by the overhead distribution records.

The work in process accounts are credited with:

1. The material, labor, and overhead costs of the production transferred to finished stock, part-finished stock, or raw materials stock accounts.
2. The total material, labor, and overhead costs of any machinery, tools, or other equipment which has been manufactured for the use of the plant and is to be capitalized among the plant assets.
3. The total material, labor, and overhead costs of maintenance and repairs which have been absorbed in the factory overhead.
4. The total material, labor, and overhead costs of the maintenance and repairs, which are absorbed in the selling and administrative expense accounts.

Adjusting entries to cover discrepancies in the cost of work in process would also be debited or credited to the work in process accounts.

Form of Work in Process Account

Of the several forms of work in process accounts the one most commonly employed is the ledger account form, in which charges and credits for material, labor, and overhead are shown in one money column as illustrated in Form 70.

If it is required to check the material, labor, and overhead charges and credits, this may be done in two ways:

1. The elements of cost may be recorded in separate accounts, as in Form 70, and headed respectively:

   (a) Work in Process Material Cost
   (b) Work in Process Labor Cost
   (c) Work in Process Overhead Cost

2. The information may all be recorded upon one account, as shown in Form 71, with separate columns for the charges and credits for material, labor, and overhead. Under this method the number of accounts is greatly reduced.

Part-Finished Stock Accounts

The part-finished stock account, or accounts, also termed "Finished Parts Account," "Manufactured Parts Account," "Completed Parts Account," control the part-finished stores ledger. One account may be kept for all part-finished stock; or the different classes of part-finished stock may each have its own account; or the main part-finished storeroom and the sub-storerooms may have separate accounts, depending upon the requirements of the plant.

As in the case of work in process, the keeping of several accounts instead of one brings to notice any large discrepancies in costs more readily, as the balances on detailed accounts are smaller and large fluctuations can be more easily detected.

WORK IN PROCESS ACCOUNT

Date	Explanation	Ref.	Amount	Date	Explanation	Ref.	Amount

Form 70. Work in Process Account. (Size, 14 x 11.)

WORK IN PROCESS ACCOUNT

Date	Explanation	Ref.	Mat.	Lab.	Ohd.	Total	Date	Explanation	Ref.	Mat.	Lab.	Ohd.	Total

Form 71. Work in Process Account, Showing Elements of Cost. (Size, 14 x 11.)

If there is only one controlling account, its balance may be so large that a discrepancy of a few thousand dollars may be passed when the balances are compared at the end of each month. When there are several accounts, discrepancies are more accurately adjusted, as the differences can then be charged to the product to which they are applicable instead of being arbitrarily distributed over the entire production. This is an important point when individual compensation depends upon the profits from special classes of product.

The obsolete finished parts carried in stock should be controlled separately, as it is important to keep a check on these items so that the capital invested in slow-moving stock may be reduced to the minimum. Finally, the account classification of part-finished stock facilitates the preparation of factory orders for the production of finished parts.

Postings to Part-Finished Stock Accounts

Part-finished stock accounts are kept practically in the same manner as those for raw material, and the procedure is the same for one or several accounts.

The part-finished stock accounts are debited with:

1. The total amount of the finished parts inventory on hand at the beginning of the period.
2. The total cost of the finished parts completed and transferred to the stock-rooms as shown by the production summaries.
3. The total cost of the transfers made from the various storerooms.
4. The total cost of such items as may be returned to the part-finished stock storerooms from the operating departments or from customers, as shown by detailed summaries covering these returns.

The part-finished stock accounts are credited with:

1. The total cost of the part-finished stock which is transferred to the operating departments for use in the manufacture of the completed articles, as shown upon a summary of requisitions or a summary of departmental material used.
2. The total cost of the part-finished stock transferred to other stock-rooms, as shown by a summary of stock transfers.
3. The total cost of part-finished stock shipped to customers, as shown by a summary of cost of sales.

The part-finished stock accounts are also debited or credited with the amount of any adjustments required when an inventory test shows that the controlling accounts are not in agreement with the detailed part-finished stores ledgers.

Finished Stock Accounts

The finished stock accounts control the finished stock ledgers, and, like the stock accounts already described, they may be kept in several ways:

1. One account for all finished stock.
2. Distinctive accounts for the different classes of finished product.
3. Distinctive accounts for the various finished stock storerooms located in different parts of the plant.

The account classification of finished stock is a valuable aid to the issuance of factory production orders and to the sales department, as the amount of stock of the different classes of product on hand is readily determined if several controlling accounts are kept in place of one. Discrepancies are more readily located and any necessary adjustments may be charged to the proper accounts. The method of entering the information to the ledger accounts is exactly the same for one or several finished stock accounts.

Posting to Finished Stock Accounts

The finished stock account, or accounts, are debited with:

1. The total amount of the inventory of finished stock on hand at the beginning of the period.
2. The total cost of the finished articles as shown by the production summary.
3. The total cost of the finished stock returned by customers as shown by the cost of returns summary.
4. The total cost of transfers made to a particular storeroom from other storerooms as shown by the summary of transfers.

The finished stock account, or accounts, are credited with:

1. The total cost of merchandise shipped, as shown by the cost of sales summary.
2. The total cost of merchandise transferred to operating departments of the plant to be used in the production of other articles.
3. The total cost of transfers to other stock-rooms as shown by the summary of stock transfers.

Entries for adjusting discrepancies are also debited or credited to the various accounts, as the case may require.

Productive Labor Accounts

Under some conditions, the productive labor is charged directly to the work in process account of each department, as incurred. This may be a correct method under certain circumstances, but its disadvantage is that the total productive labor for a fiscal period cannot readily be ascertained. To meet this requirement a productive labor account may be opened and charged with the direct wages week by week, or as required, and credited with the charges to departments at the end of the period; or a separate productive labor account may be kept for each department and closed out to the work

in process account for that department at the end of the period. The needs of each case determine in what detail the labor element of cost should be recorded.

Factory Indirect Expense Accounts

Each item of indirect expense is applicable to definite operating departments and provision must be made for showing the charge in each case. The simplest method is to open an account for each item of overhead for each department, and this is the method used in large concerns. The obvious drawback to this method is the large number of expense accounts which it entails. The number can be greatly reduced by recording the information for all departments upon a ledger account for each item, as in Form 72. The form of this account may be arranged so that the name of the department appears in the heading and the columns show the various items of factory overhead applicable to that department, as illustrated in Form 73.

If it is necessary to post any credits to the above accounts, they should be entered in different colored ink so as to show that the items are to be deducted from the rest of the transactions, or a separate account for showing credits should be used.

After the total department overhead is ascertained, provision must be made for transferring this total to the department work in process accounts, in which the overhead must be absorbed. To make this transfer in the simplest way possible, each overhead account may be credited at the end of the cost period and the total in each case charged to the work in process account of that department. This procedure, however, would necessitate numerous postings. For example, there might be from ten to twelve entries to the credit of each item of expense, and assuming that there are a dozen or more departments, the large amount of detailed posting can be readily seen, as the ten or twelve overhead items would be applicable

(NAME OF FACTORY INDIRECT EXPENSE ITEM)

DATE	EXPLANATION	REF.	TOTAL AMOUNT	DEPT. NO. 1	DEPT. NO. 2	DEPT. NO. 3	DEPT. NO. 4	DEPT. NO. 5	DEPT. NO. 6	DEPT. NO. 7	DEPT. NO. 8

Form 72. Factory Indirect Expense Account for Each Item. (Size, 14 x 11.)

DEPARTMENT NO. 1.—FACTORY INDIRECT EXPENSES

DATE	EXPLANATION	REF.	TOTAL AMOUNT	INDIRECT MATERIAL	INDIRECT LABOR	RENT	INSURANCE	TAXES	DEPRECIATION	LIGHT, HEAT & POWER	REPAIRS	SUPPLIES	SUNDRY EXPENSES	

Form 73. Factory Indirect Expense Account for Each Department. (Size, 14 x 11.)

to most of the operating departments. A short-cut may be provided by means of a separate account styled "Distributed Overhead Account."

Distributed Overhead Accounts

The distributed overhead account is used:

1. For the purpose of showing the total amount of overhead applicable to each department.
2. For the purpose of saving time in posting when it is necessary to transfer the total amount of the factory overhead items to the various work in process accounts.

A distributed overhead account should be kept for each department of the plant, including productive, non-productive, and miscellaneous departments, and for general operating expenses. When the transfers of the overhead items are made to the work in process accounts, the total amount of departmental overhead is debited to the departmental work-in-process account and the total credit is posted to the distributed overhead account for that department. This eliminates the necessity of posting the credits in detail to each of the detailed expense accounts.

This last method is also used in transferring the total amount of general operating expenses. The distributed overhead account for the general operating expenses is credited, and corresponding charges are made to the various non-productive department accounts; a trial balance may then be prepared for the factory overhead accounts. This provides a method of balancing the factory overhead expense items separately from the other factory accounts. The raw material, work in process, part-finished stock, and finished stock accounts would then show the condition of the items of the merchandise inventory.

General Ledger Account

A General Ledger account is opened on the factory ledger when it is desired to make the factory ledger self-balancing. This account is the reverse of the Factory Ledger account on the general ledger.

The General Ledger account is credited with:

1. The total amount of merchandise inventory as the charges are made to the various raw material, work in process, part-finished stock, and finished stock accounts at the beginning of the period.
2. The total amount of merchandise and supplies purchased during the cost period, as shown by the purchase record or voucher register—the raw material accounts being debited.
3. The total amount of productive and non-productive labor for the period, as shown by the pay-roll analysis—the productive labor, non-productive labor accounts, or work in process accounts being debited.
4. The total amount of factory overhead expenses for the period, as shown by the purchase record or voucher register and the fixed schedules or miscellaneous analysis records—the various detailed factory overhead accounts being debited.
5. The total cost of the merchandise returned during the period, as shown by the summary of cost returns, the offsetting entries being the debits to the various finished stock or part-finished stock accounts.

The General Ledger account is debited with:

1. The total cost of sales, as shown by the summary of cost of sales—at the time the finished stock or part-finished stock accounts are credited.

2. The total cost of machinery, tools, or miscellaneous equipment as shown by the production summary—at the time the various work in process accounts are credited.
3. The total cost of repairs and the total cost of miscellaneous supplies transferred to the selling or administrative departments of the business—at the time the various work in process accounts and raw material accounts are credited. This information would be shown upon the production summaries and material requisition summaries.

The balance of the General Ledger account is always a credit, and is in agreement with the total amount of the debit balances shown by the other factory ledger accounts, and also with the debit balance of the Factory Ledger account upon the general ledger.

Any adjustments in inventory compilations which affect the factory ledger accounts must necessarily be reflected by means of an entry in the General Ledger account.

Summary of Factory Ledger Controlling Accounts

Form 74 summarizes the discussion of the factory ledger accounts.

Classification Chart of Factory Ledger Accounts

For the same reason that it is advantageous to draw up a classification sheet of the general ledger accounts of a large manufacturing plant, the factory ledger accounts may also be illustrated by means of a chart (Form 75). In preparing such a chart, the accounts should be given symbol numbers. It may be noted that factory ledger controlling accounts vary in number from the three simple accounts previously described to several hundred.

FACTORY LEDGER ACCOUNTS For purpose of controlling detailed cost compilations dealing with material, labor, and overhead costs	Methods of Controlling	Factory Ledger accounts forming a part of General Ledger accounts Factory Ledger accounts in a subsidiary ledger which is not self-balancing but which is controlled by a Factory Ledger account in the General Ledger Factory Ledger accounts in a subsidiary ledger which is self-balancing and which is also controlled by a Factory Ledger account in the General Ledger
	Raw Materials Account (Controls the Raw Material Stores Ledger)	One account for all Raw Materials and Supplies Distinctive accounts for controlling various classes of Merchandise of Raw Material and Supplies Distinctive accounts for controlling Main Storeroom and Sub-Storeroom or various storerooms depending upon location
	Work in Process Account (Controls the Cost Sheets of Jobs, Orders, or Articles in Process)	One account for all Work in Process Distinctive accounts for each Operating Department Distinctive accounts for each Job or Order or for each Process or Machine
	Part-Finished Stock Account (Controls the Part-Finished Stores Ledger)	One account for all Part-Finished Stock Distinctive accounts for various classes of Part-Finished Stock Distinctive accounts for Main and Sub-Storeroom depending upon location
	Finished Stock Account (Controls the Finished Stock Stores Ledger)	One account for all Finished Stock Distinctive accounts for various classes of Finished Stock Distinctive accounts for Main and Sub-Storeroom depending upon location
	Productive Labor Account	One account for all items Separate accounts for the various departments
	Factory Indirect Expenses	One account for all items classified Distinctive accounts for various items Distinctive accounts for various items in each department Distributed Overhead accounts
	General Ledger Account	

Form 74. Chart of Factory Ledger Controlling Accounts

Copies of the chart of accounts should be prepared, preferably upon heavy cardboard so as to permit of ready reference by the clerks in the accounting and cost accounting departments. Copies of suitable portions of the chart should also be given to the factory superintendent, foremen, factory clerks, production manager, order department clerks, and any employees in the organization who may require information for charging or crediting the detailed items to the proper accounts.

Form of Factory Ledger

A factory ledger may be a bound book or a loose-leaf book. In most instances it is more practicable to use a loose-leaf book for the reason that sheets with ruling to suit different accounts may then be inserted in the same binder, thus saving the added expense of printing different kinds of rulings in the bound book.

Simple ledger rulings are usually practicable for the raw material, part-finished stock, and also the overhead accounts, although the items of overhead are often recorded upon a special columnar sheet. The information as to the work in process is, as a rule, recorded upon a sheet ruled to suit particular requirements.

Arrangement of Factory Ledger Accounts

The arrangement of the accounts in the ledger should receive attention. While they are often arranged according to their symbol numbers, as their classification is more or less standardized, they may be grouped in sections in the following order:

1. Raw material accounts
2. Work in process acounts
3. Part-finished stock accounts

RAW MATERIAL ACCOUNTS

Name of Account	No.
Lumber	300
Raw Material—Paints and Varnish	301
Raw Material—Steel Parts	302
Raw Material—Other Items	303
General Supplies	304

WORK IN PROCESS ACCOUNTS

Name of Account	No.
A* Cutting Department	310
B Machine Department—Special Work	311
C Machine Department—Standard Work	312
D Assembling Department—Special Work	313
E Assembling Department Standard Work	314
F Finishing Room	315
G Trimming Department	316
H Inspecting Department	317
J Packing Department	318

*Letters A-J represent productive operating departments of the plant.

FINISHED PARTS STOCK ACCOUNTS

Name of Account	No.
Finished Sides	330
Finished Legs	331
Finished Pulls	332
Other Finished Parts	333

FINISHED STOCK ACCOUNTS

Name of Account	No.
Desks	340
Chairs	341
Rockers	342
Settees	343
Cabinets—Standard	344
Cabinets—Special	345

Form 75. Classification Chart

4. Finished stock accounts
5. Productive labor accounts
6. Distributed overhead accounts
7. Detailed factory overhead accounts

The sections should be distinguished by means of tab indexes marked according to the classifications. Where detailed overhead accounts are kept for each department, it may be well to furnish additional tab indexes within this section marked with the departments of the plant so that the overhead accounts of one department may be readily distinguished from those of another.

In large plants the factory ledger is divided into two rec-

FACTORY INDIRECT EXPENSES

Name of Account	A No.	B No.	C No.	D No.	E No.	F No.	G No.	H No.	J No.	Power Plant No.	Cost Office No.	Storeroom No.
Supervision	360	380	400	420	440	460	480	500	520	540	560	580
Clerks' Salaries	361	381	401	421	441	461	481	501	521	.....	561	581
Non-Productive Labor	362	382	402	422	442	462	482	502	522	542	.....	582
Repairs	363	383	403	423	443	463	483	503	523	543	563	583
Depreciation	364	384	404	424	444	464	484	504	524	544	564	584
Insurance—Fire	365	385	405	425	445	465	485	505	525	545	.....	585
Insurance—Liability	366	386	406	426	446	466	486	506	526	546	566	586
Rent	367	387	407	427	447	467	487	507	527	547	567	587
Taxes	368	388	408	428	448	468	488	508	528	548	.....	588
Supplies	369	389	409	429	449	469	489	509	529	549	569	589
Experimental Work	370	390	410	430	450	470	490	510	530	.....	.....	.....
Defective Work	371	391	411	431	451	471	491	511	531	.....	.....	.....
Light, Heat, and Power	372	392	412	432	452	472	492	512	532	.....	572	592
Sundry Expenses	373	393	413	433	453	473	493	513	533	553	573	593
General Operating	374	394	414	434	454	474	494	514	534	554	.....	.....

of Factory Ledger Accounts

ords, one containing the raw material, work in process, part-finished stock, and finished stock accounts, and the other containing the overhead expense accounts. When the method of proving the factory overhead separately from the other factory ledger accounts is used, as previously explained, the above division can readily be made.

Verification of Controlling Accounts

Most of the factory ledger accounts are controlling accounts, and, when a trial balance of the factory ledger is prepared at the end of the period, provision must be made for verifying the balances of the controlling accounts. The veri-

fication of the detailed balances of the controlling accounts may be made in several different ways.

If money values are entered upon the stock records, a trial balance may be prepared from the raw material, finished parts, and finished stock stores ledgers, and these may then be proved with their respective controlling accounts in the factory ledger. If money values are not entered upon the stock records, verification of the controlling accounts can be made only after cost values are inserted at the end of each period and the calculation is made for the entire quantity on hand. Therefore, when only quantities appear upon stock records, the controlling accounts cannot be so readily or so frequently tested. All controlling accounts should be verified at least once during the fiscal year, because the financial results based upon book inventories cannot be accepted as correct without this verification.

If the stores ledger records are in agreement with the corresponding controlling accounts, a test should be made of the detailed accounts by checking their balances with the merchandise actually on hand in the various storerooms. All merchandise on hand in the raw material, finished parts stock, and finished stock storerooms should be verified by actual count at least once during a fiscal period.

In verifying the balances shown upon the work in process accounts, reference must be made to the detailed uncompleted cost sheets of the various jobs, orders, or articles in the course of manufacture or to the detailed uncompleted process cost records. If the total amounts of cost as obtained from these detailed cost sheets and cost records are listed and added, the result obtained should be in agreement with the balances as shown by the work in process accounts. However, differences in overhead are bound to occur. The overhead applied to the detailed cost records may be based upon a fixed rate or percentage which cannot be absolutely correct—due to fluctuations

in production and also to fluctuations in the amount of overhead at different times during the fiscal period. When a test is made of the balance of the work in process account, consideration must be given to adjustments of this overhead rate.

As already stated, the detailed work in process accounts should provide for a separate verification of the material, labor, and overhead costs. However, the verification with the cost sheets or process cost records does not complete the test. The latter must be verified with the actual uncompleted work in process as shown by reports which should be obtained from the various foremen or factory department clerks.

In large plants, where the records show that work is not being done regularly upon certain jobs, the cost sheets relating thereto should be investigated to see why the work is delayed. This investigation often leads to a disclosure of discrepancies in cost.

Adjusting Discrepancies in Cost

The verification of the factory accounts with the subsidiary records and with actual facts as they exist in the different storerooms and operating departments of the plant usually discloses discrepancies which are bound to occur in the operation of every cost system. These discrepancies should be investigated, and if they cannot be properly explained, adjusting entries should be made upon the detailed records as well as upon the controlling accounts affected. Such entries should not be postponed until the end of the fiscal period. All inventory adjustments should be made through an Inventory Adjustment account so that these items may be shown separately in the preparation of factory and financial statements.

Much stress is sometimes laid upon the mathematical proof of a cost system at the end of a fiscal period. If at that time a single adjustment is made and if the discrepancies represent a small percentage of the total cost of production,

the cost expert compliments the system, and incidentally himself. However small in amount the discrepancies may be, the fact remains that they may cover up many leaks, which if investigated during the fiscal period would probably have led to a considerable saving. For example, some items of stock may be in excess and others short of their book balances, and when an accounting is made at the end of the fiscal period the excess amounts may offset the shortages to the extent that only a small net amount remains. Thus, the amount of any difference is not always a true index of the efficiency of a cost system and is not as important as the cause which produced the difference. Cost systems are installed for the purpose of discovering leaks which should be remedied. Too much attention may be paid to proving figures rather than to applying remedies to prevent discrepancies.

Closing of Factory Ledger Accounts

Where the factory ledger accounts form part of the general ledger, the closing entries are made through a Manufacturing account, and then through the Profit and Loss account. Adjusting entries affecting the raw material, work in process, and finished stock accounts are made after a physical inventory is taken to prove the book balances at the end of a fiscal period.

Where separate factory ledger accounts are kept they constitute a perpetual inventory and the closing of the factory ledger accounts is unnecessary. Inventory differences should be adjusted when the discrepancies are discovered by tests made during the fiscal period. Where complete physical inventories are not taken at any one time, it is assumed that the balances as shown upon the factory ledger are reliable and accurate. Adjusting entries are always made when conditions show that it is necessary to do so. All adjusting entries should be entered in an Inventory Adjustment account, which

amount should be absorbed in the profit and loss transactions when the regular financial accounts are closed.

When the factory ledger accounts are closed at the end of each fiscal period, the detailed factory overhead accounts should be credited with the total amount debited to the distributed overhead accounts. As the credit balances of the distributed overhead accounts offset the debit balances of the current factory overhead accounts, the closing entries above described should balance the factory overhead accounts. As the overhead items are transferred to work in process accounts, they are necessarily included as part of the merchandise inventory.

CHAPTER XXI

FINANCIAL AND FACTORY STATEMENTS

Time and Form of Preparation

In considering the kinds of statements which may be prepared from cost data, attention must be given to the time of their preparation as well as their form. As to time, they may be prepared for the particular cost period under review or for the current fiscal year to date in cumulative form. Reports of a special character dealing with matters which should receive the prompt attention of the management may be prepared daily, weekly, or whenever necessary. As to form, they may either be statistical or graphic; that is, they may show the results and operations tabulated by means of figures giving quantities or values, or both; or the money values and quantities may be shown by means of graphic charts. The reports may cover a particular period or several periods. The figures should be so arranged that results may be readily compared and also be reduced to percentages or rates as a further means of making comparisons.

Kinds of Reports

The reports which may be prepared from the information shown by a comprehensive cost system may be classified under the four following headings:

1. Reports to executives.
2. Reports to the sales department.
3. Reports to the purchasing department.
4. Reports to the factory superintendent or production manager.

In a small business one set of factory and financial statements, prepared at the end of a definite period, usually suffices for the needs of the various executives and department heads. In a larger business the statements would, of course, be much more numerous and extensive.

Reports to Executives

The reports covering a definite period which may be submitted to executives would include the following:

1. Balance sheet, showing the financial condition of the concern.
2. Profit and loss statement, showing the financial operations of the concern.
3. Manufacturing statement, showing the financial operations of the factory. This statement may be combined with the profit and loss statement, or it may be prepared upon a separate form and contain more detailed information as to the results of the production.
4. Statement of merchandise inventory.
5. Statement showing the additions to, and deductions from, the plant and equipment.

Balance Sheet

The balance sheet is a statement of assets, liabilities, and capital, showing the financial condition of the concern, and may be prepared at the end of the cost period. This statement is compiled from the general ledger trial balance, with the supporting general ledger accounts, and should be arranged with attention to some definite classified form, the various classes of assets and liabilities being shown under separate captions. The different methods of presenting the details of the balance sheet are discussed in many works on general accounting and need not be considered here. It is only neces-

sary to assert that the statement should show the following information:

On the assets side: (1) the current assets of cash, accounts receivable, and bills receivable; (2) working and trading assets, which would include the information as to the various classes of merchandise inventory; (3) investments in stocks, bonds, and any miscellaneous outside investments; (4) fixed assets, such as land, buildings, machinery, tools, furniture, fixtures, and equipment; (5) fixed intangible assets, such as good-will, patents, copyrights, trade-marks, and items of a similar character; (6) deferred charges, which would include unexpired insurance premiums, prepaid rents, prepaid interest, and other prepaid expenses chargeable to later operations.

On the liabilities side: (1) the current liabilities of notes and accounts payable: (2) miscellaneous loans of stockholders or partners which are more or less fixed in character; (3) fixed liabilities, such as bonded indebtedness and mortgages; (4) reserves, which include contingent reserves or provision for probable losses (if these items are deductible from the asset values, they may appear as deductions from the assets on balance sheet); (5) capital stock, or the capital accounts showing the partners' or proprietor's investment in the business; (6) surplus, if the organization is a corporation. If a deficit exists, the amount may be shown in red ink upon the liabilities side, or provision may be made for showing it as a separate amount upon the assets side. When it appears upon the assets side, care should be exercised to be sure that the total amount of the assets is shown separately before considering the deficit.

The items on the balance sheet should be arranged in a methodical and predetermined order, depending to a large extent upon the significance of the information to the business. Form 76 is a form of balance sheet which illustrates the arrangement sometimes followed by large manufacturing concerns.

THE BROWN MANUFACTURING CO.
New York, N. Y.

COMPARATIVE BALANCE SHEET

Details	(Date of end of Current Month)		(Date of end of Previous Month)		Increase or Decrease	
Assets:						
Petty Cash Fund						
First National Bank						
City Trust Company						
Salesmen's Cash Funds						
Branch Office Cash Funds						
Accounts Receivable						
Notes Receivable						
Merchandise Inventory						
Land						
Buildings						
Factory Machinery and Equipment						
Factory Small Tools						
Office Equipment						
Deferred Charges						
Total Assets						
Liabilities:						
Notes Payable						
Accounts Payable						
Loans						
Accrued Salaries and Wages						
Accrued Interest						
Accrued Taxes						
Mortgage						
Total Liabilities						
Reserves:						
Depreciation						
Doubtful Accounts						
Capital Stock						
Surplus						
Net Income to Date						
Total Liabilities and Capital						

Form 76. Balance Sheet. (Size, 8 x 16.)

Profit and Loss Statement

A profit and loss statement is compiled to show the financial operations of a business represented by income, costs, and expenses. A quite simple form of profit and loss statement is illustrated in Form 77. This may be supplemented by supporting schedules showing the data in greater detail.

In cases where sales are divided into several classifications, both the sales and cost of sales should be analyzed by departments, and the gross profit in each case may then readily be ascertained. In determining the net profit from the operation of each sales department, consideration must be given to its proportion of the selling and administrative expenses. The distribution of these expenses is usually based upon the percentage which the cost of sales of each department bears to the total cost of all sales. As in the case of factory overhead items, as many as possible of the detailed items of selling and administrative expenses should be charged directly to the departments to which they are applicable. For example, under certain conditions the commission rates allowed salesmen upon different products sold often vary, in which case an analysis of the commissions paid should be made so that each sales department may be charged with its correct proportion.

Often the sales departments or classifications are so well established that the salaries of their personnel may be charged to them directly rather than distributed upon some arbitrary basis. Office rent may also be distributed on the basis of the floor space used in the general or sales offices for the different classes of product sold. The remaining items of selling and administrative expenses are usually distributed arbitrarily.

Arbitrary distribution methods may affect the compensation of individuals in the organization whose income is derived from the sales of certain products. For that reason, this method of distributing the selling and administrative expenses leads to argument when the charge to a particular de-

partment is considered an excessive burden. To avoid controversy the charge is often based on a predetermined percentage. If this is done it may be found, when the books are closed at the end of the period, that some of the items have been over-absorbed and others under-applied. Adjustments will then have to be made by distributing the difference over departments upon an arbitrary basis, or the net amount of the difference may be deducted from or added to the total profits.

The profit and loss statement is prepared, as a rule, from the general ledger accounts unless these show totals which control detailed subsidiary ledgers or analysis records. In this case reference must necessarily be made to the supporting records before a complete profit and loss statement can be prepared.

If the statements are prepared for the fiscal period to date, the figures of the general ledger trial balance may be used. On the other hand, if the transactions cover the current cost period only, the data appearing on the statements would be obtained from the ledger accounts unless a general ledger trial balance is taken at the end of each month. The difference between the ending and beginning balances of the income and expense acounts shows the net amount of the transactions for the period as entered on the profit and loss statement.

Manufacturing Statement

The manufacturing statement may be made out separately, or combined with the profit and loss statement, and where this is done, it is termed a "Manufacturing and Profit and Loss Statement." When made out separately it is termed "Statement of Factory Expenditures" or "Statement of Factory Operations." The data for its preparation would be obtained from the controlling factory cost accounts, kept either in the general ledger or in the subsidiary factory ledger.

In the profit and loss statement the departmental divi-

THE BROWN MANUFACTURING CO.
New York, N. Y.

PROFIT AND LOSS STATEMENT

For the Period.....19.....

Details	Sales (Net)		Cost of Sales		Gross Profit		Selling and Administrative Expenses		Net Profit or Loss	
Gowns.....										
Dresses.....										
Suits.....										
Cloaks.....										
Waists.....										
Miscellaneous.....										
Total Sales.....										
Total Cost of Sales.....										
Total Gross Profit.....										
Total Expenses.....										
Total Net Profits.....										

Form 77. (a) Profit and Loss Statement (upper part)

SUMMARY OF OPERATIONS			
NET PROFIT (As above)			
MISCELLANEOUS INCOME:			
Interest Earned			
Discount Earned			
Sundry Earnings			
TOTAL INCOME			
DEDUCTIONS FROM INCOME:			
Interest Allowed			
Discount Allowed			
Sundry Items			
NET INCOME			

PERCENTAGES		
DETAILS	CURRENT PERIOD	PREVIOUS PERIOD
COST OF SALES		
GROSS PROFIT		
SELLING EXPENSES		
ADMINISTRATIVE EXPENSES		
TOTAL EXPENSES		
NET PROFIT		

REMARKS

.....

.....

SELLING EXPENSES		
SHIPPING DEPARTMENT:		
Supervision		
Wages		
Rent		
Supplies		
Repairs		
Depreciation		
Insurance		
Light and Heat		
Teaming, etc		
Expenses		
SALESMEN'S SALARIES		
SALESMEN'S COMMISSIONS		
ADVERTISING		
SALES OFFICE:		
Rent		
Stationery		
Postage		
Supplies		
Repairs		
Depreciation		
Light and Heat		
Samples		
Telephone and Telegraph		
Conventions		
Expenses		
TOTAL		

ADMINISTRATIVE EXPENSES		
Executives' Salaries		
Office Clerks' Salaries		
Executives' Expenses		
Printing and Stationery		
Postage		
Office Supplies		
Repairs		
Depreciation		
Light and Heat		
Telephone and Telegraph		
Charity		
Mercantile Reports		
Association Dues		
Collection Expenses		
Legal Expenses		
Auditing Expenses		
Sundry Expenses		
TOTAL		

Form 77. (b) Profit and Loss Statement (lower part). (Size of complete form, 9 x 16.)

sions are based on the classification of the product. In the manufacturing statement they are based on the departments of the factory, and therefore would cover: (1) movement of the material in the various raw material storerooms; (2) the charges and credits affecting the manufacturing departments; (3) the movement of the merchandise kept in the various finished stock storerooms.

Form 78 is a simple form of manufacturing statement which shows the inventories of, and the charges and credits affecting, the operating departments, the raw material, and the finished stock. This form of statement may be expanded to show a summary of the total of all of these transactions, supported by detailed schedules for each operating department.

The section which deals with the transactions affecting the operating departments shows: (1) the cost of the work in process, and the inventory at the beginning of the month; (2) the charges for the material requisitioned from stock, this amount being in agreement with the amount of material requisitioned as shown by the section dealing with the storeroom operations; (3) the productive labor charged to the operating departments; (4) the items of indirect expenses charged to departments.

From the total of the above charges is deducted the production of finished stock, which should be in agreement with the amount charged to finished stock.

The section covering the raw material transactions starts with the opening inventory—which should be in agreement with the inventory records and the previous report—and shows the purchases and other charges to the raw material ledger. After deducting the total amount of material requisitioned, which should be in agreement with the amount charged to the operating departments, the balance of the inventory on hand at the end of the period is known.

The section dealing with the finished stock operations also

MANUFACTURING STATEMENT

For..... .....19.....

Details	Operating Departments: Cutting	Mach. Special Work	Mach. Stand. Work	Assem. Special Work	Assem Stand. Work	Finishing	Trimming	Inspecting	Packing	Total for all Depts.
Charges:										
Direct Material										
Direct Labor										
Indirect Expenses:										
Supervision										
Clerks' Salaries										
Non-Productive Labor										
Repairs										
Depreciation										
Insurance—Fire										
Insurance—Liability										
Rent										
Taxes										
Supplies										
Experimental Work										
Defective Work										
Light, Heat and Power										
Sundry Expenses										
General Operating Expenses										
Total										
Work in Process—Beginning										
Total										
Credits:										
Production										
Work in Process—Ending										

Details	Raw Material Classifications: Lumber	Paints, Etc.	Steel Parts	Other Items	Supplies	
Inventory—Beginning						
Purchases (Net)						
Total						
Delivered to Operating Depts						
Inventory—Ending						

Finished Stock Summary	
Inventory—Beginning	
Production	
Total	
Cost of Sales	
Inventory—Ending	

Form 78. Manufacturing Statement. (Size, 14 x 11.)

shows the inventory on hand at the beginning of the period and the charges for production, the total of which should be in agreement with the amount credited to the operating departments. From the total inventory and production is deducted the cost of the sales, which amount should be in agreement with the cost of sales as shown in the profit and loss statement. The resulting balance represents the amount of the finished stock inventory at the end of the period. The inventory balance for each section should be in agreement with the amount of inventory as shown on the balance sheet.

The form of manufacturing statement here illustrated is appropriate for use in small industries. Where the operating departments and the classifications of raw material and finished goods are numerous, a single form designed to contain all the information may be cumbersome. Under these circumstances, several statements would have to be prepared, giving the information in detail for each department and for each classification of the material and product manufactured.

Trading Statement

In mercantile concerns a trading statement is prepared in place of a manufacturing statement, to show the trading operations and results for the period under review. These transactions are often combined with the transactions shown in the profit and loss statement, and in that case the statement is known as a "Trading and Profit and Loss Statement."

The trading statement shows the sales and the cost of sales for the period, the information for this cost being obtained in the following manner:

1. To the opening inventory are added:
   - (a) Current merchandise purchases.
   - (b) Freight and cartage inward.
   - (c) Duty and import expenses, if any.
   - (d) Any other items of cost.

2. From the sum of the above items is deducted the value of the closing inventory. The resulting figure represents the cost of sales.

Statement of Merchandise Inventory

In large manufacturing plants it is often essential to know the capital invested in the merchandise inventory, in which case a statement showing the amount of the inventory of each of the raw material, work in process, finished parts, and finished stock classifications should be prepared. This information is obtained from the factory accounts, as already noted, which may be kept in either the general ledger or a subsidiary factory ledger.

Form 79 represents a form of statement upon which the information as to the merchandise inventory may be so arranged as to show quantities on hand as well as cost values. Under some conditions it is not always necessary to list the detailed classifications of the inventory in detail, it being sufficient to show items of a doubtful character or those which should be brought to the attention of the executive.

Statement of Changes in Plant and Equipment

While the value of the merchandise inventory is usually fairly presented in the statements made out at the end of a cost period, in many cases fluctuations in the value of plant and equipment are ignored until the end of the calendar or fiscal year. Arbitrary depreciation rates, depending upon the financial results of the business, are then often established. If the profit is large, a liberal allowance for depreciation is made; if the profit is small or only a fair amount, there may be a correspondingly small deduction for depreciation. When changes in the value of plant assets during the year are ignored, repairs or maintenance charges which should be absorbed in the factory overhead are often capitalized.

COMPARATIVE STATEMENT OF MERCHANDISE INVENTORY

For.....19.....

Details	(Ending Date of Current Period)		(Ending Date of Previous Period)		Increase or Decrease	
Summary of Totals:						
Raw Material						
Work in Process						
Finished Parts						
Finished Stock						
Total						
Raw Material:						
Lumber						
Paints and Varnishes						
Steel Parts						
Other Raw Material						
General Supplies						
Total						
Work in Process:						
Cutting Department						
Machine Department:						
Special Work						
Standard Work						
Assembling Department:						
Special Work						
Standard Work						
Finishing Room						
Trimming Department						
Inspecting Department						
Packing Department						
Total						
Finished Parts:						
Sides						
Etc.						
Total						
Finished Stock:						
Desks						
Chairs						
Etc.						
Total						

Form 79. Comparative Statement of Merchandise Inventory. (Size, 8 x 16.)

In order that the management may be kept informed of the cost of the up-keep of the building, plant, and equipment, a statement should be compiled to show any important changes in these asset values. Such a statement may not be necessary when additions to plant and equipment are slight, but where the value of the assets fluctuates from one period to another. as it usually does in large plants, a statement similar to Form

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF CHANGES IN PLANT & EQUIPMENT

For.....19.....

Details of Changes	Amounts			
New Equipment Purchased:				
.....				
.....				
New Equipment Manufactured:				
.....				
.....				
Equipment Destroyed:				
.....				
.....				
Other Plant Changes:				
.....				
.....				

Remarks:

Form 80. Statement of Changes in Plant and Equipment. (Size, 8 x 16.)

80 should be prepared to show the amount of these valuation changes. If complete plant asset records are kept, the statement can be prepared in detail from these records, the entry of transactions relating thereto being shown in total on the controlling accounts in the general or private ledger. Another useful purpose of this statement is that the information it contains often serves as a check on the unnecessary purchases of equipment, revealing as it does the value of the equipment in each department.

Reports to the Sales Departments

The reports to the sales departments may include:

1. Statement of salesmen's sales, costs, and expenses.
2. Statement of production, shipments, and inventory of finished stock.
3. Daily statement of sales and costs.
4. Statement of special items showing low margin of gross profits or gross losses.
5. Statement of sales, actual costs, and estimated costs.
6. Statement of obsolete and slow-moving finished stock.

Statement of Salesmen's Sales, Costs, and Expenses

A statement showing the sales, cost of sales, expenses, and profit of individual salesmen, or of a particular territory, is a valuable means of judging the efficiency of the sales organization. In a small business, this statement may usually be prepared from the information shown on general ledger accounts and be supported by detailed analyses. In a large business analytical records should be kept to show the current sales of each salesman—which are proved with the total net sales as shown by the sales and return sales summaries—and the cost of sales. This information clearly reveals the amount of business done by each salesman, and the cost of the business is proved with the cost of sales account in the general ledger.

The expenses and commissions of each salesman may be shown in separate general ledger accounts. Sometimes, however, details as to commissions and expenses are kept in a subsidiary analysis record, which should be in agreement with the total of the salesmen's expenses and commission accounts as shown on the general ledger. A statement of this character is valuable as a means of ascertaining the rates of commissions to be allowed on the different products sold and as a guide in awarding a bonus for exceptional effort on the part of individual salesmen.

Form 81 is a simple form which provides the spaces and columns for recording the sales, cost of sales, and expenses of individual salesmen. Other columns may be added, to show daily averages of the sales, costs, and expenses, as a means of judging whether or not the traveling and hotel expenses of an individual salesman are excessive. It follows that a statement of this character may be used to advantage in adjusting salesmen's commissions and expense allowances.

In many businesses, sales also originate through a mail-order or through showroom orders, in which case they may not be credited to an individual salesman. Where a mathematical proof of the bookkeeping work is required, all orders which are received direct in the above way should be grouped under a caption termed "Miscellaneous Sales." This method provides for proving the totals of the sales when an analysis is made.

It will be noted that Form 81 shows a column for net sales only. Under some conditions it may be well to provide for columns showing gross sales, returns and allowances, and net sales. If discount rates differ upon the various products manufactured, columns should also be provided for recording the rate and the amount of discount to be deducted from the sales in order to ascertain the profit resulting from the business done by each salesman.

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF SALESMEN'S SALES, COSTS, AND EXPENSES

For.....19 .....

Name of Salesman	Sales				Selling Costs				Net Profit	
	Amount	Cost	Gross Profit	Per Cent	Salaries or Commissions	Expenses	Total	Per Cent	Amount	Per Cent
Totals										

Approved..... Correct.....

Form 81. Statement of Salesmen's Sales, Costs, and Expenses. (Size, 14 x 11.)

Statement of Production, Shipments, and Inventory of Finished Stock

The statement which shows the condition of the merchandise inventory and the movements of finished stock has been discussed under the head of reports to executives. It is often desirable to submit a similar, but more detailed, statement to the sales department, showing the cost value of the current production, shipments, and inventory of the finished stock items, as illustrated in Form 82. Columns are provided thereon for recording the inventory at the beginning of the period, to which should be added the cost of current production. The total of these two columns is entered in the total amount column, and the deduction for the cost of the current shipments in a fourth column. The resulting balance, which represents the inventory on hand at the end of the period, is entered in the last column. This statement may be prepared either for all of the various classifications of the product, or for only those items which should receive the special attention of the sales department so that an additional effort may be made to sell lines which are becoming obsolete or which are slow-moving.

Daily Statement of Sales and Cost of Sales

It is often advisable to prepare a daily statement (Form 83) of sales, cost of sales, and gross profits as an aid to the sales department in judging the efficiency of the sales force. If the product manufactured is standard and the articles in the line are numerous, such a statement may present an extensive classification of the product. For example, it may show the shipments of each line and the returned merchandise separately, so as to establish a proof of the financial statements when they are prepared at the end of the cost period; or it may be prepared for special lines only which show a loss or a poor margin of profit. The detailed routine of a complete cost sys-

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF PRODUCTION, SHIPMENTS & FINISHED STOCK

For..... ....19.....

Details	Inventory (At beginning of period)		Production		Total Inventory and Production		Cost of Shipments		Inventory (At end of period)	
Desks:										
Style 300.....										
Style 400.....										
Style 500.....										
Chairs:										
Style 700.....										
Style 800.....										
Rockers.....										
Settees.....										
Cabinets:										
Style 1100.....										
Style 1200.....										
Totals.....										

Form 82. Statement of Production, Shipments, and Inventory of Finished Stock. (Size, 9 x 6.)

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF SALES AND COST OF SALES

For.....19.....

Details	Gross Sales	Returns	Net Sales	Cost of Sales	Gross Profit
Desks:					
Style 300					
Style 400					
Style 500					
Chairs:					
Style 700					
Style 800					
Rockers					
Settees					
Cabinets:					
Special					
Style 1000					
Style 1100					
Style 1200					
Miscellaneous					
Totals					

Form 83. Daily Statement of Sales and Cost of Sales. (Size, 14 x 11.)

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF SALES SHOWING LOSSES AND SMALL PROFITS

For.....19.....

Name of Customer and Nature of Sale	Sales		Cost of Sales		Gross Profit or Loss		Per Cent
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
Totals.....	.....	.....	.....	.....	.....	.....	.....

Form 84. Statement of Sales, Showing Profit or Loss on Special Items. (Size, 9 x 16.)

tem should provide a means of bringing such items to the attention of the management. At the end of the month, therefore, it is well to tabulate these items in statement form for the purpose of submitting them to the sales department, which can then dispose of them as seems fit.

The reason for the poor margin of profit or the reason for the gross losses should also be stated. It may be due to an inaccurate estimate of the selling price, or to extraordinary conditions affecting the material, labor, or overhead costs.

Form 84 may be used for preparing a statement showing the results of gross profit or loss upon special items or lines.

Statement of Sales, Actual Costs, and Estimated Costs

A check upon the work done by the estimating department is always advisable, and this may be accomplished by a statement which compares actual with estimated costs. Such a report is very valuable where special products are manufactured for the individual requirements of customers, or where bids are offered and prices are based upon an estimate of costs.

The statement should give the order number, a description of the product manufactured, and sales or contract prices, while the actual cost and estimated cost of each order should be tabulated in separate columns. It may also be well to furnish a detailed comparison of the elements of cost; that is, the actual material, labor, and overhead costs on each order may be compared with the estimated costs of these items. In this way, the cause of any errors in the estimate is often discovered. Some estimating clerks may be fairly well informed as to labor cost but may take too much for granted when estimating the material requirements. Or again, it may be found that changes in overhead rates are responsible for the errors in making up the original estimate of costs.

In this connection it is important to emphasize the necessity of co-operation between the cost and estimating departments. The cost department can be of assistance to the estimating department when items of a similar character are manufactured or when a request is received for an estimate on an order which was manufactured some years ago. The cost department records should be accessible to the estimating department, and if co-operation exists between the two, a better basis obtains for providing the sales department with the figures needed to make a satisfactory selling or contract price.

Form 85 is a simple form which may be used for reporting the information as to sales, actual costs, and estimated

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF SALES—ACTUAL AND ESTIMATED COSTS

For.....19.....

Name of Customer and Nature of Work	Sales		Actual Costs								Estimated Costs							
			Total		Material		Labor		Overhead		Total		Material		Labor		Overhead	

Form 85. Statement of Sales, Actual Costs, and Estimated Costs. (Size, 14 x 11.)

costs. This form may be developed by the addition of other columns to show departmental costs when these are desired

Statement of Obsolete or Slow-Moving Finished Stock

When it is more advantageous to have the information as to obsolete or slow-moving stock appear upon a separate statement, this may be prepared in addition to the statement of production, shipments, and inventory of finished stock which has been previously mentioned. A statement of this kind should show quantities as well as costs. The tendency in most factories is to allow obsolete articles and material to accumulate for a long period, no effort being made to dispose of them. Such obsolete stock and material may form part of the inventory year after year. As a rule, it is only brought to the atten-

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF OBSOLETE FINISHED STOCK ITEMS

For.....19.....

Style or Grade No.	Description of Article	Quantity	Value	

Form 86. Statement of Obsolete or Slow-Moving Stock. (Size, 8 x 11.)

tion of the management when an inventory is taken at the end of the fiscal period, and often, under these circumstances, no definite decision is reached as to its disposal. If the cost system provides for the preparation of a special report on these items at the end of definite periods, this helps to arouse the sales department to action and leads to the disposal of those items which are salable. Form 86 may be used to show the value of the obsolete finished stock items.

Reports to the Purchasing Department

Not much is required in the way of reports to the purchasing department, as this department is chiefly interested in the raw material and supplies on hand, concerning which information can readily be obtained from the stores ledger. This information may be supplemented by the following reports:

1. Statement of merchandise purchases and inventory of raw materials.
2. Statement of obsolete raw materials.
3. Statement of maximum and minimum quantities compared with the inventory quantities.

The above statements, which may all be prepared from the information shown by the stores ledger accounts, give particulars of each item composing the raw material inventory—unless the classification of materials is so extensive that it is practicable to call the attention of the management only to items of an extraordinary character.

Form 87 summarizes the purchases and inventory of each class of raw material. It may readily be expanded to give further information as to the material used during the period or month. In that event the inventories on hand at the beginning and end of the period, together with the purchases for the period, would provide the purchasing department with a

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF MERCHANDISE PURCHASES AND INVENTORY

For.....19.....

Article No.	Description of Article	Beginning Inventory		Purchases (Net)		Total Inventory and Purchases		Material Used		Ending Inventory	

Form 87. Statement of Merchandise Purchases and Inventory of Raw Materials. (Size, 14 x 11.)

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF OBSOLETE RAW MATERIAL ITEMS

For.....19.....

Article No.	Description of Article	From Whom Purchased	Quantity	Unit Price		Total Value	

Form 88. Statement of Obsolete Raw Material Items. (Size, 14 x 11.)

basis for judging whether or not the factory was overstocked on any particular item.

If data as to the obsolete stock of raw materials on hand does not appear upon the above statement, a special report of these items should be submitted explaining why they are not being used. If they cannot be used in the course of manufacture, or if they cannot be substituted for other items, some decision should be reached as to their disposal. Form 88 is a simple form for reporting the value of obsolete stock.

The third statement listed above which compares the maximum and minimum quantities with the inventory quantities of the raw material items furnishes valuable information for estimating the material requirements of the factory in the

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF INVENTORY QUANTITIES

For.....19.....

Article No.	Description of Article	Inventory Qty.	Maximum Qty.	Minimum Qty.	Over or Short

Form 89. Statement of Maximum and Minimum and Actual Quantities. (Size, 8 x 11.)

near future. The first essential step towards efficiency in the purchasing department is to insure an adequate stock of raw materials and supplies so that the material needed for definite orders may be promptly available. Orders must be completed on the date promised if customers are to be satisfied. A comparison of the maximum quantities with inventory quantities may also show that the factory is overstocked on some items and thus enable the proper balance to be struck between sufficiency and surplus or excess. The information for this report may be shown satisfactorily upon a form similar to Form 89.

Reports to Factory Superintendent and Production Manager

Reports to the factory superintendent and production manager should cover every phase which reflects the efficiency of the manufacturing departments, and may include:

1. Statement of costs and production.
2. Statement of labor statistics and cost averages.
3. Statement of obsolete orders in process.
4. Statement of factory expenses composing the factory overhead.
5. Statement of machine statistics showing repairs, shut-downs, etc.

Statement of Costs and Production

A detailed statement of costs and production may be prepared for each operating department, and in some cases it may be practicable to combine the information upon one form. The report would be prepared from the work in process accounts and should summarize and analyze the material, labor, and overhead items of cost by kinds and classes of product, as illustrated in Form 90. If the inventory on hand at the beginning and end of the period is also shown, this enables the factory superintendent to judge whether or not too much work in process is accumulating in the plant. Reports of this char-

STATEMENT OF COSTS AND PRODUCTION

.....DEPARTMENT

For.....19.....

DETAILS OF CHARGES	CURRENT PERIOD		PREVIOUS PERIOD		INCREASE OR DECREASE	
MATERIAL CHARGES.....						
PRODUCTIVE LABOR CHARGES.....						
OVERHEAD CHARGES:						
Supervision.....						
Non-Productive Labor.....						
Repairs.....						
Depreciation.....						
Insurance.....						
Taxes.....						
Rent.....						
Supplies.....						
Defective Work.....						
Experimental Work.....						
Light, Heat, and Power.....						
Sundry Expenses.....						
TOTAL CHARGES.....						

SUMMARY OF CHARGES

DETAILS	TOTAL		MATERIAL		LABOR		OVERHEAD	
WORK IN PROCESS (Beginning).....								
TOTAL CHARGES (as above).....								
TOTAL.....								
WORK IN PROCESS (Ending).....								
BALANCE (Production).....								

PRODUCTION

DETAILS	CURRENT PERIOD		PREVIOUS PERIOD		INCREASE OR DECREASE	
STANDARD PRODUCTION:						
Desks.....						
Etc.....						
SPECIAL PRODUCTION:						
Cabinets.....						
Other Work.....						
TOTALS.....						

Form 90. Statement of Costs and Production. (Size, 9 x 16.)

acter, when compared with those of previous periods, often show discrepancies in cost charges.

If possible, a statement of production and costs should show the quantities of articles manufactured where the product is made for stock or where process costs are required. Average unit costs may then be obtained and can be used as a check on the efficiency of the operating departments.

Statement of Labor Statistics and Cost Averages

Form 91 may be used for presenting labor statistics and cost averages, such as the number of productive and non-productive employees in each operating department, total wages paid during the period, average daily and weekly wages paid.

The labor statistics may be elaborated further by showing the number of employees at the beginning of the period, number of new employees added, and number of employees who have left. Information of this character is valuable as a means of estimating tendencies in the labor market. For example, it may be discovered from the statistics that more men than usual leave at certain times during the year, when perhaps the labor market shows a shortage. At other times there may be an abundant labor supply and the reports may show that few employees leave the shops during that particular period. Such information is a valuable aid in judging whether or not new business should be added to the regular production at certain periods of the year.

Statement of Obsolete Orders in Process

Obsolete or slow-moving uncompleted orders in process should be called to the attention of the factory superintendent upon a report similar to Form 92. Information for preparing this report is obtained from the uncompleted cost sheets and other cost records. Orders sometimes go astray or are lost in the course of manufacture, yet the uncompleted cost sheets

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF LABOR COSTS AND AVERAGES

For.....19.....

Departments	Average Number of Non-Productive Workers	Days in Operation	Productive Labor Hours	Average Number of Productive Workers	Productive Wages		
					Average per Hour	Average per Day	Average per Week
Cutting.....							
Machine—Special.....							
Machine—Standard.....							
Assembling.....							
Finishing.....							
Trimming.....							
Inspecting.....							
Packing.....							

COMPARATIVE AVERAGES

Totals for All Departments	Non-Productive Workers	Days in Operation	Productive Labor Hours	Productive Workers	Wages per Hour	Wages per Day	Wages per Week
Current Period.....							
Previous Period.....							
Same Period Last Year.....							

Form 91. Statement of Labor Costs and Averages. (Size, 14 x 11.)

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF OBSOLETE ORDERS IN PROCESS

For.....19.....

Order or Job No.	Description of Work	Date of Order	Accumulated Cost	
	Total.....			

Form 92. Statement of Obsolete or Slow-Moving Orders in Process. (Size, 8 x 11.)

and records still show that they form part of the work in process inventory. If the attention of the management is drawn to these items by means of a regular report they may be investigated, and, if advisable, their cost written off the books.

Statement of Factory Expenses

The form of the statement of factory expense will depend to some extent upon the method of overhead distribution in use. The report may be arranged to show the indirect expenses applicable to each department, or separate departmental reports may be rendered. If the rates are fixed in advance, these should be compared with the actual rates for the period. This information, which may be entered upon a form similar to

Form 93, may be obtained from the factory expense accounts. Any unusual increases in items of expenses should be noted for the attention of the management.

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF FACTORY EXPENSES

.....DEPARTMENT

For.....19

DETAILS	CURRENT PERIOD		PREVIOUS PERIOD		INCREASE OR DECREASE	
Supervision						
Clerks' Salaries						
Indirect Labor						
Repairs						
Depreciation						
Insurance—Fire						
Insurance—Liability						
Rent						
Taxes						
Supplies						
Experimental Work						
Defective Work						
Light and Heat						
Power						
Sundries						
General Operating						
TOTALS						
COMPARISON OF OVERHEAD RATES						
Established Rates						
Actual per Above Expenses						

Form 93. Statement of Factory Expenses. (Size, 8 x 11.)

Statement of Machine Statistics

If the machine rate method of overhead distribution is in use, the report should show the items chargeable to each ma-

THE BROWN MANUFACTURING CO.
New York, N. Y.

STATEMENT OF MACHINE COSTS

.....DEPT. OR PROCESS

For.....19.....

ITEMS OF COST	AMOUNT	
LABOR		
OVERHEAD:		
Indirect Labor		
Repairs		
Depreciation		
Insurance		
Taxes		
Rent		
Interest		
Supplies		
Power		
Light and Heat		
General Operating		
TOTAL		

MACHINE STATISTICS

DETAILS	CURRENT	PREVIOUS
Number of Machines		
Total Running Time		
Cost per Hour		
Labor Cost per Hour		
Repair Cost per Hour		

DETAILS OF REPAIRS

DESCRIPTION	AMOUNT

Form 94. Statement of Machine Costs. (Size, 8 x 5.)

chine; and the report may cover the entire plant, or separate reports may be rendered for each machine. The form may be elaborated for comparing the current machine rates with those for the previous period, or with the standard rates.

Machine statistics dealing with the repairs and maintenance charges on particular machines may also be prepared separately and submitted on a form similar to Form 94, and may be combined with the expense report described above. The most important feature of this report is the number of operating hours, commonly termed "running time," as it enables comparisons to be made with the standard time or previous records.

Summary of Financial and Factory Statements

The financial and factory statements which cover the operation of a complete cost system are shown on Form 95.

Method of Presenting Statements

All information contained in the reports described in this chapter may be obtained from the accounts, trial balances, and cost summaries without the necessity of closing the accounts. After the books of original entry are closed for the period, and current transactions are posted to the general and factory ledgers preparatory to taking a trial balance, the trial balance figures should be in agreement with those of the supporting subsidiary records. The reports may then be prepared for the period under review.

Reports should be submitted regularly and should be presented as promptly as possible. To be of value they must be up to date.

The style of the form used will obviously depend upon the information which is desired, the governing conditions being the needs of the executive. As he is not a trained bookkeeper or accountant, the forms should be presented in the simplest possible way. Some executives prefer all facts and figures to

FINANCIAL AND FACTORY STATEMENTS Time and Form of Preparation.	Reports to Executives	1. Balance Sheet 2. Profit and Loss Statement 3. Manufacturing Statement (Statement of Factory Expenditures—Statement of Factory Operations) 4. Merchandise Inventory 5. Changes in Plant and Equipment
	Reports to Sales Department	1. Statement of Salesmen's Sales, Costs, and Expenses 2. Statement of Production, Shipments, and Inventory of Finished Stock 3. Daily Statement of Sales and Costs 4. Statement of Sales and Cost of Sales by Special Items or Lines 5. Statement of Sales, Actual Costs, and Estimated Costs 6. Statement of Obsolete or Slow-Moving Finished Stock
	Reports to Purchasing Department	1. Statement of Merchandise Purchases and Inventory of Raw Materials 2. Statement of Obsolete Stock of Raw Materials 3. Statement of Maximum and Minimum Quantities compared with Inventory Quantities
	Reports to Factory Superintendent and Production Manager	1. Statement of Costs and Production 2. Statement of Labor Statistics and Cost Averages 3. Statement of Obsolete Orders in Process 4. Statement of Factory Expenses 5. Statement of Machine Statistics showing Repairs, Shut-Downs, etc.

Form 95. Chart of Financial and Factory Statements

be entered upon one large sheet. This often leads to the use of a cumbersome sheet which is so elaborate that the information shown can be grasped only by one thoroughly familiar with the detail.

While reports usually cover past performances, they also serve as a basis for future action. Unless the information shown upon them is actually being used or means something to the executive to whom it is submitted, it is worthless. Considerable time is often wasted in the preparation of elaborate statements which are of little, if any, value to the man for whom they are prepared. To sum up, reports are compiled to be studied by executives and department heads with the object of remedying defects or improving existing conditions.

Disposition of Statements

Reports accumulate very rapidly and ample provision should be made for a ready reference to them if they are to be of any value as a means of making comparisons. Cumbersome sheets are apt to be folded and inserted in desk pigeonholes or drawers, and, when it is desired to refer to old reports, time is wasted because the information cannot be obtained readily. Therefore, in designing the forms it is well to consider the use of a standard size sheet for all reports. This will permit their being filed in a loose-leaf binder indexed by means of tabs used to mark the different kinds of reports.

The practice of binding all reports together for one definite period often leads to confusion when comparisons are desired. A better practice is to combine those of like character, when they may not only be compared readily, but also quick reference may be made to a particular report of any period.

Style and Ruling of Reports

Specially ruled reports which are prepared to meet the requirements of a particular industry are expensive. Often

large numbers of forms are printed; conditions then change and the stationery has to be scrapped. As generally only one report form a month is used, it will be seen that to print any quantity is not economical. Therefore, in most instances the reports may be typed or prepared with pen and ink upon standard-ruled sheets. Different styles of ruling often answer the needs of several reports.

Interlocking and Agreeing Reports

The information shown upon two or more reports may often be combined into one, while some reports may be eliminated if they fail to fill a need. Wherever the figures in one report are the same as those in another, they should be compared to see that the results and financial facts interlock or are in agreement. Under some circumstances cost summaries may be designed to serve as reports to the management.

Time of Presenting Reports

To insure the attention of the management being given to the reports, it is well to have regular conferences, at which time the information as shown thereon may be discussed. If this is impracticable, the report should provide space for any remarks as to special items which it contains, or the remarks may be submitted in the form of an attached communication.

The work on regular reports should not interfere with the preparation of special reports at any time that information of a special character is desired. A cost system is a source of detailed information to which the management should have access. As it is impossible for executives and department heads to examine the accounts and records, any useful information should be submitted in report form. Too often, information is submitted in verbal form which should be embodied in regular written reports.

CHAPTER XXII

METHOD OF TAKING INVENTORY

Inventory Methods

Because cost-finding provides for the keeping of a perpetual inventory, it does not necessarily follow that the taking of physical inventories is entirely eliminated. Physical inventories must be taken at regular intervals and the cost accounts verified with actual facts, as shown by an actual count of the items of stock on hand in the raw material, finished parts, and finished stock storerooms as well as the work in process in the operating departments. This verification is necessary to ascertain discrepancies as soon as they arise.

Even where an up-to-date cost system is in use, adjustments in the valuation of inventory items have to be made from time to time. For example, certain items may become obsolete, or market conditions both as to the purchase of materials and the sale of finished product may change, making it necessary to adjust the valuations of certain items when financial statements are prepared. A cost system does, however, eliminate the necessity for taking a complete physical inventory in a limited time for the reason that, values being recorded in the books, the physical count and check may be done gradually and the work spread over the year. This method is used when the records of the cost system are reliable and form a basis for a physical inventory. When no cost system is in operation and when it is desired to ascertain the financial condition of the concern, an actual physical count of all items composing the merchandise inventory must be made at a definite time.

Testing the Inventory

When different portions of the merchandise inventory are tested at different times during the year, it is often practicable to have a fixed schedule showing what items should be tested and the dates when the tests should be made. A simple inventory test form is given in Form 21, page 93. This form is intended for testing the correctness of the entries in the detailed stores ledger accounts, finished parts, and finished stock accounts. It may provide for a test as to quantities only or for valuations as well.

The information as to the actual amounts and quantities should be shown on the form and these amounts should be compared with the balances of the ledger accounts. Any differences should be investigated, as it may be found that various charges and credits have been posted to the wrong stores ledger accounts. These clerical errors should be adjusted and the inventory discrepancies eliminated. When after thorough investigation the differences cannot be located, provision should be made for charging the items to an Inventory Adjustment account on the general ledger. This will guard against the "covering up" of this information.

Inventory Adjustments

Inventory adjustments should not be absorbed in the factory overhead without calling the attention of the management to their necessity. If a record of these items is established, comparisons may then be made with future periods until they finally reach a minimum. Under certain conditions these adjustments may need to be made because of thefts, short-weights, or intentional tampering with the stock. In such cases, the loss should not be absorbed in the factory overhead but should be charged as a special deduction to profit and loss.

In many businesses, it is the practice to give stock away as

samples or for other purposes, often without any record of their disposal. If the records are to be accurate, the cost of such gifts should be charged to a Sample Expense account and included among the selling expenses. Gifts also may be a selling or administrative expense charge and as such should be deducted from the factory gross profit. The value of free goods is often not realized until a record is kept of their amount.

Inventory Sheet

For the purpose of checking the controlling inventory accounts, the information shown upon the detailed inventory test forms may be summarized upon a regular inventory sheet such as shown in Form 22, page 94. This form is more or less standardized and is sold by large stationery houses. It may be used for summarizing the inventory of raw materials and supplies, finished parts, and finished stock items when actual physical or book inventories are calculated.

The items of work in process may be summarized upon a specially ruled inventory sheet. It should provide columns for details as to the material, labor, and overhead costs. Form 96 is a sample sheet for this purpose.

Physical Inventories

Where no perpetual inventory is kept, a physical inventory should be taken at least once during the fiscal year, for the purpose of ascertaining the financial condition. In large manufacturing plants the taking of a physical inventory is often a burdensome and complicated undertaking. The listing and counting of the items composing the merchandise on hand is usually made upon inventory sheets similar to those of Form 22 (page 94) and Form 96. This method of taking the inventory is, however, unsatisfactory in that too often the work is done hurriedly and in haphazard fashion.

INVENTORY SHEET—WORK IN PROCESS

For.....19.....

No.....

Listed by..... Priced by..... Calculations Verified.....

Checked by..... Extended by..... Approved.....

Order No.	Quantity	Description	Costs							
			Total		Material		Labor		Overhead	

Form 96. Work in Process Inventory Sheet. (Size, 9 x 12.)

A cost system, to be accurate, must be based on the facts shown by a physical merchandise inventory. Therefore it is most essential that the latter should be complete and thorough. Many systems fail because of an inaccurate inventory used as the starting point. Discrepancies then appear in the balances within a short time, and in explanation of these discrepancies the suggestion is made that they are perhaps due to errors in the opening inventory. This throws the whole system out of gear and is a frequent cause of discouragement to employees who are making a sincere effort to keep accurate records.

In considering the taking of a physical inventory, the following points should be noted:

1. Preparatory work for the inventory.
2. Instructions to be issued.
3. Method of taking the inventory.
4. Method of listing items.
5. Method of pricing items.
6. Method of figuring items.
7. Method of checking the inventory.
8. Method of proving and summarizing the inventory.

Preparation for Physical Inventory

Some time before the date for taking a physical inventory, instructions should be issued to the factory foremen and factory clerks to prepare for this work, which will be done during a certain period. In large plants, while the work is in progress, all manufacturing operations should cease, as it is impossible to make an accurate count of items while the plant is in operation. In smaller plants it may be possible to take a fairly accurate inventory while work is being done, but these instances are few and accuracy may be sacrificed for the sake of speed.

The preparatory work consists of cleaning up the stockrooms and operating departments to see that all items are

stacked in an orderly manner. Raw materials which are found on workmen's benches or which are in the operating departments should be sent to the stock-rooms to be placed in the proper bins, drawers, or racks. Material of like character should be grouped or stacked in some definite arrangement so as to enable a rapid count to be made. Material hidden away in corners or "nooks" of the storerooms and departments should be brought out where it will receive attention. Obsolete items or materials which are slow-moving should be stacked separately.

Special orders, standard product orders, repair orders, and construction orders which are in process in the operating departments should be kept in distinctive piles. The work in process is often difficult to describe in the inventory, and therefore all items that can possibly be transferred to stock or reach a definite state of production should receive attention during the period when the preparatory work is being done. Some of this preparatory work can be handled only when the plant is shut down, but a large part of it may be done beforehand.

Department foremen sometimes try to rush the current work through and transfer it to subsequent operating departments so that they will have little to do when the time comes to take the inventory. As this practice may disorganize production, it should be discouraged.

Instructions as to the Taking of the Inventory

Instructions as to the method of taking the inventory should be given to the employees responsible for the counting, entering, checking, listing, pricing, calculating, summarizing, and proving of the items. Instructions should be plain and should specify that the machinery, tools, and miscellaneous equipments are not to be included in the inventory. If an inventory of these items is desired, it should be taken separately upon records prepared especially for the purpose.

The instructions should be typed and handed to the clerks responsible for the work so that they will know exactly what to do and the manner in which it should be done. This information should cover the order of counting and entering the items and the description to be entered upon the inventory sheets or tags. Any instructions covering work in process should be explicit. When only partial information is sent to the office, costs cannot be properly calculated because the description of the job is not sufficient to identify it.

Method of Taking the Inventory

The method of taking the inventory depends to some extent upon the lay-out of the plant, the products manufactured, and the existing conditions and time allotted to the task. Rarely is sufficient time allowed for accurate work, the tendency being to rush it through as one of the burdens and "bugbears" of office detail. Therefore, factory employees who may be delegated to this important task do not realize its bearing on the financial statements prepared at the end of the fiscal period.

If possible, the work should be done by men who are experienced in clerical detail and who also have a knowledge of the product, operations, and processes. Where a complete cost system is in use, the stock and factory clerks are usually qualified by experience and clerical training to take a complete physical inventory. The work should be supervised by a responsible official, such as the factory superintendent, production manager, head cost accountant, purchasing agent, or head stock clerk, who know the value and realizes the importance of accuracy.

In large plants it is well to divide the supervision so that each official may be held responsible for different sections of the inventory. For example, the head of the purchasing department, or head stock-room clerk, may be made responsible

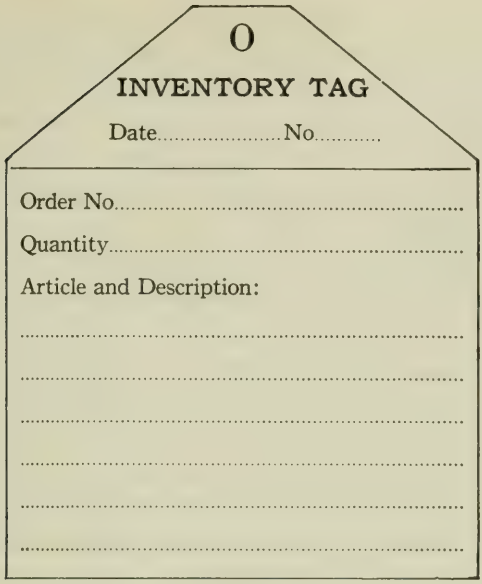
for the raw material items; the factory superintendent or production manager may be responsible for the finished parts and work in process items; the head clerk of the finished stock department, or head of the sales department, for the items of finished stock; while the head cost accountant or clerk in charge of the cost department may be the supervising authority over all, to whom items which are questionable may be referred.

In taking inventory the old-fashioned method of doing the actual listing in the factory is found to be impracticable in large plants and is becoming more and more obsolete. For one reason, items are often overlooked, and for another, when the men listing the items are interrupted the tendency is to forget where they left off. As the articles themselves do not show any mark, it is often impossible to tell very readily which items were listed and which were not listed.

What is known as the "Inventory Tag Method" does away with the drawbacks mentioned, and for this reason has become more or less the standardized method in most manufacturing and mercantile industries. The principle of this method is that every item to be inventoried must be tagged. The tags are simple, containing the information shown in Form 97.

The tags should be numbered in advance and may differ in color for use with the different classifications of the inventory. For example, white tags may be used for raw material stock items, buff for finished stock items, pink for finished parts stock items, and green tags for work in process items. Or, again, different colored tags may be used for the various stock-rooms and operating departments. Where the inventory is not a large one, little is gained by the use of different colors, as all tags are numbered in advance.

Definite series of numbered tags should be given to the persons who are to enter upon them the description of mer-


O

INVENTORY TAG

Date.....No.....

Order No.....

Quantity.....

Article and Description:

.....

.....

.....

.....

.....

.....

Form 97. Inventory Tag. (Size, 3 x 4.)

chandise inventory, and these should be receipted for and a record kept at the office as to the person responsible for each such series. The quantity of tags given to an individual will, of course, depend upon the number or items he has to inventory, and he may obtain more as required by signing for their receipt.

The men who will do the actual counting and entering of the inventory should attach these tags to the various articles. All items of stock in all departments, whether finished stock, finished parts stock, or work in process, and also each different kind of goods composing the raw material inventory should be tagged separately in order to arrive at the quantity on hand of each particular article or material.

The tags may be attached in a conspicuous manner to a bin, tray, or holder, or tied to an article which forms part of a

bundle or stack of material. After all the items in a particular department or stock-room have been tagged and the entries made, the inspectors should test some of the items. Under some conditions, it may be necessary to recheck and verify the entries on the tags of every detailed item. This is especially true where the business is being terminated by reason of a sale or liquidation.

After the inspectors are satisfied that all items have been properly counted within a particular department, the tags may be removed from the stacks of articles, after which operations may be resumed, provided these do not interfere with the inventory work of any other stock-room or department.

After the tags are collected, they should be arranged in serial number to see that none are missing. If any disappear, an inventory may be incomplete as to those items, but with a reasonable amount of care missing tags may be reduced to a minimum. All tags, including those which may have been voided, should be returned to the office, and after all have been accounted for, the inventory may be listed.

Method of Listing the Inventory

Under some circumstances the tags may contain prices and total costs and be kept as a permanent inventory record, the listings being done upon adding machine slips. In other cases, it is well to provide for a complete listing of the inventory upon forms similar to Forms 22 (page 94) and 96.

In listing the items care should be taken to see that the description, quantity, and other reference marks are properly recorded upon the inventory sheets. It is often well for another set of clerks to call off the details from the tags and verify the information on the sheets. Items of the same kind should be grouped together on separate inventory sheets.

The items of raw material, work in process, finished parts

stock, and finished stock should all be listed separately so that a total may be ascertained for each of these classifications. Where there are different kinds of raw material classifications, each class should be listed separately, also the work in process for each operating department.

In large plants the listing may be simplified and considerable time saved by using tabulating machines, which sort, group, and total the information upon perforated tags.

Method of Pricing the Inventory

The pricing of a merchandise inventory is often complicated by market conditions and also by the purposes for which the inventory is to be used. For example, if a complete inventory is taken for the purpose of proving the workings of a cost system, it may be necessary to price the items at values shown by the various cost records. If it is necessary to show a conservative valuation at market or cost, whichever is lower, two pricings may have to be made, one to prove the results of the cost system and another to obtain a statement of financial condition and establish a conservative basis for the opening inventory of the next period.

No inventory valuations made expressly for the purpose of proving a cost system should be carried upon the records. Values must at all times be accurately stated. If prices of material and labor decline, it is essential to consider the effect of this drop on inventory values regardless of any proof of the cost system. Financial statements should be based upon facts as nearly as it is possible to ascertain them. Therefore, inventory valuations must be stated conservatively when financial statements are prepared. It is advisable for a separate set of clerks to check the inventory prices. Failing this, at least some person in authority who has a definite knowledge of the product should review and OK the prices, questioning for the purpose of investigation all items which are doubtful.

Pricing Raw Material

The information for pricing the raw material items may be obtained from either the raw stock records, purchase department price records, or market quotations, depending upon which is available. If the cost values as shown by the raw material stock records are lower than the market quotations, either the average cost or the last cost may be used for pricing the raw material items. In any event, as already emphasized, the cost values should be stated conservatively and if a cost value is used, it should always be lower than the market value.

Pricing Work in Process

The work in process inventory items are the ones that are most difficult to value when complete costs are lacking. Often these items are priced at the best guess obtained from the estimating cost clerk, sales department, purchase department, or factory foremen. Where a cost system is in operation, the cost records should be used as a basis for valuing the work in process inventory. Under the order method of cost-finding, as all work is done upon some definite order number, work in process items may be connected with the particular cost sheet of that order. All information as to costs would then be obtained from the cost sheets. Where the process method of cost-finding is in use, the prices are obtained from the average costs, as shown by the detailed cost records of the various processes. It is therefore important to consider the exact state of all items composing the merchandise inventory, and in entering these items the last operation or process which they have undergone should be stated.

The prices for inventorying the work in process are often based upon a standard or predetermined cost which may be inaccurate. Where the labor costs are standardized, only fluctuations in the material need be considered. The fluctuations are so important that information as to these costs should be

obtained from purchase department records or raw stock records if complete records of prices are kept thereon.

As costs consist of material, labor, and overhead, the valuations placed upon work-in-process inventory items must also consist of these three elements of cost. For example, if a large contract were three-quarters completed, the costs of that job would not consist of material and labor alone. Three-quarters of the overhead also would have accumulated and should be included in the inventory value of the work in process.

Pricing Finished Parts and Finished Stock Items

The method of pricing the finished parts stock and finished stock items should also be considered. Where complete costs are kept, the prices for these items may be obtained from the various stock records which would show average costs to date. In some cases where the stock records do not show costs, the information for pricing the finished stock and finished parts stock items would be obtained from the cost sheets or other cost records. Where no cost system is in operation, the costs of finished parts or finished stock are obtained from predetermined or estimating cost records. Too often these items are guesses which cannot be verified and proved with actual facts.

Whenever finished stock and finished parts stock items are priced, consideration must be given to possible fluctuations in material and labor costs, while the overhead should be conservatively computed.

Figuring, Checking, and Proving the Inventory

In taking inventory the figuring work consists principally of multiplications and additions, and in calculating quantities and prices care should be exercised not to confuse unit prices with prices per dozen, per gross, or whatever the quantity may

be. The various calculating devices, such as adding and multiplying machines, are of great assistance. Also, some concerns are organized for the express purpose of calculating inventories for manufacturers and mercantile businesses. As the taking of an inventory entails much additional work, and as these concerns place a corps of clerks at the disposal of the business which utilizes their services, it is often advisable to engage temporary help of this character so as to eliminate much of the drudgery and overtime usually necessary.

Where the pricing and calculating is done directly upon inventory sheets (Form 22, page 94, and Form 96, page 380), all multiplications and additions should be recalculated. Even this, however, does not insure accuracy, as the same errors may be made by different clerks. Therefore, as a further safeguard, prices and total amounts may also appear upon the inventory tags (Form 97). The comparison of one amount with the other insures accuracy. Another method is to have two clerks price the inventory without seeing each other's figures. To this end two columns are ruled on the inventory sheet. After the first calculations are made, one column is detached and later compared with the second set of figures entered in the second column. If the totals agree, the calculations may be taken as accurate.

Where a cost system is in operation, the merchandise inventory may be proved with the controlling accounts and subsidiary ledgers. As the sections of the merchandise inventory show the total values of raw material, work in process, finished parts stock, and finished stock, these totals may be compared with the respective controlling accounts. If the latter, as already explained, are subdivided, a proof may be made with each classification of the material, work in process, finished parts stock and finished stock. In the same way the material, labor, and overhead costs of the work in process may be proved by means of separate controlling accounts.

CHAPTER XXIII

PLANT ASSET RECORDS

Nature and Valuation of Plant Assets

In a well-planned cost system it has been seen that the cost accounts show a comprehensive analysis of the items composing the merchandise inventory. A corresponding amount of attention should be given to the items composing the plant assets, which include assets of a fixed character such as land, buildings, and machinery, or those of a more or less portable character such as small equipment and tools. All of these items are subject to change in character and construction and some of them may be transferred to different parts of the plant, while some are of a perishable nature and should be considered separately.

When complete records have not been kept which balance with the accounts, it is necessary to obtain a valuation of the asssets by means of an appraisal. As a rule an appraisal shows the sound or depreciated values and reproduction values, and if carefully made may serve as a basis for the proper depreciation charges.

The various items composing the plant assets should be specified by definite names and symbol numbers. In some instances it is well to paint the numbers on the machines, fixtures, and miscellaneous equipment, or a metal tag bearing the symbol number may be attached to each piece of equipment.

Plant Asset Record

The records which support the asset items may take the form of either loose-leaf sheets or cards. Like other ledger records, they constitute a subsidiary ledger, the balances of

PLANT ASSET RECORD

Nature and Description of Asset..... No.....

.....

.....

Location in Plant.....

Purchased from..... Date Purchased.....

Manufactured by..... Date Made.....

DEPRECIATION DATA

Estimated Life..... Depreciation Rate per Annum.....% Amount per Month $.....

COST			REPAIRS AND DEPRECIATION				
DETAILS	AMOUNT		YEARS	REPAIRS		DEPRECIATION	
Net Purchase Price.....							
Freight, etc.....							
Handling Cost.....							
Installation Cost.....							
TOTAL.....			TOTALS.....				

Form 98. (a) Plant Asset Record (face). (Size, 8 x 5.)

MONTHLY DETAIL OF REPAIRS

MONTH																
January																
February																
March																
April																
May																
June																
July																
August																
September																
October																
November																
December																
TOTALS																

Form 98 (b) Plant Asset Record (reverse). (Size, 8 x 5.)

which should be in agreement with the various controlling accounts kept upon the general or private ledger. The method of filing the sheets or cards would depend upon the classification of the equipment and the system of symbols in use. If numbers are used as symbols, different series may denote particular types of machines in particular departments. These records are illustrated in Form 98, which shows the cost value in each case and provides spaces for recording the date of acquisition and the number and description of each machine. The back of the record may be ruled to provide information as to the repair and maintenance charges of each machine.

Purposes of Plant Record

A comprehensive plant asset record, when properly controlled, serves the following purposes:

1. It shows the valuation of each asset, the detailed items of which are controlled by the various accounts in the general or private ledger.
2. It provides a comprehensive basis for ascertaining depreciation rates applicable to definite cost periods.
3. It is valuable as an insurance record for judging the amount of insurance which it is necessary to carry, and for the purpose of settling disputes in case of fire losses.
4. It provides a system of recording the information as to the repairs and maintenance charges.
5. It serves as a basis for judging the efficiency of a particular machine when used in connection with production reports for a definite period

Machines

Machines may be purchased, or may be constructed at the plant. If purchased they should be valued at the total cost to deliver, which includes freight and cartage inward. This cost

may be supplemented by the cost of installing the machine ready for operation.

When a machine is constructed in the plant, the question often arises as to the correct method of estimating its value. The construction of special machinery often entails a large amount of experimental work, and this obviously forms part of its cost. While no item of equipment should ever be overvalued, yet the full time and material consumed in its manufacture, as well as overhead, should all be considered. Often the item of overhead is ignored in a desire to state the value of expensive machinery or equipment conservatively. As costs consist of material, labor, and overhead, machinery constructed at the plant should be charged with these three elements.

If the construction cost of a machine proves to be excessive and it is found that it could be purchased in the open market at a much lower price, it should not be included among the fixed assets at this excessive value. While this would be the true cost of the machine, a correct and conservative policy of valuation never includes exaggerated asset values. For example, in order to find work for the employees of a woodworking plant, some desks were constructed during a slack period, the costs on which proved to be in excess of the price for which the desks could be purchased in the open market. When the costs of these desks were ascertained, a portion of these costs should have been charged as a profit and loss deduction so that the true value of the desks, included in the assets accounts, would not have been overstated.

The expense of installing machines often constitutes an important item of their cost for the reason that special platforms or foundations may have to be built before the machinery is ready for operation. Installation costs, therefore, form part of the cost of the equipment installed.

When machines are transferred from one department to

another, values are often destroyed in one place which are more than offset by the new value added to the machine set up in another place. For example, the old foundation or platform in the one place may be destroyed, whereas the platform used for installing the machine in its new location may cost considerably more than the one destroyed.

To provide for a proper accounting of such a transfer, it is necessary to deduct the value destroyed and set up among the assets the new cost of installing the machine in the new location. This is often a difficult accounting problem when a whole department is transferred and the removal is covered by one factory order. If the costs incidental to moving and those relating to the new construction and equipment are combined or compiled together, no basis exists for analyzing the costs so that the expense accounts may be properly charged and the asset accounts conservatively set up. Therefore, wherever possible, a separate order should cover the transfer of each machine so that the costs in each case may be kept separate, thus furnishing the basis for a complete system of plant asset records.

Tools

Tools considered as plant assets include large, special, and small tools, excepting those which are perishable in character. Special tools made for the needs of a plant should be closely guarded by complete records. Small manufacturing concerns have been known to be wrecked by the theft of their special tools.

A tool room is often the most important stock-room of a mechanical plant, and therefore the necessary records should be kept to watch closely the tools used in the operating departments. A simple method applicable to small tools is to place them in numbered racks or hang them on numbered hooks. When an employee requires a tool, a receipt should

be obtained. This receipt usually takes the form of the employee's tag number, which is hung upon the hook or rack from which the tool was taken. When the tool is handed in by the employee responsible for its return, his metal tag is handed back to him. Like all other stock-rooms, the tool room should be under lock and key and in charge of a special clerk who should be held responsible for its orderly maintenance and for all items lost.

As it is impracticable to keep an elaborate detailed record of the miscellaneous small tools, these items may be grouped and recorded upon loose-leaf sheets or cards and controlled separately by a general or private ledger account. Large tools and all tools of special character should be recorded upon separate records similar to Form 98, these containing a complete description of each tool, covering its cost, repair, and depreciation rate. Large and special tools should be treated in the same manner as machines and other large items of equipment.

Fixtures

Plant fixtures, which consist of the benches, desks, racks, bins, etc., should be controlled separately and should be designated by symbols. The information as to their cost should be recorded upon plant asset records, giving a complete description of each article.

Machine Parts

Miscellaneous large machine parts are often included as a portion of the cost of the machine to which they belong. Where this is not done, a separate plant asset record should be allotted to each machine part similar to the forms used for tools and machines. Otherwise, if these parts are not kept track of, production may be interfered with by their loss when required for use.

Dies, Molds, Etc.

In many industries, dies, molds, flasks, patterns, and the like, form an important part of the plant assets. Many of these items are made or purchased for the requirements of special orders, and in consequence are often charged directly to the cost of the particular job on which they are used. When this is not practicable, their cost should be absorbed in the overhead by means of depreciation rates.

Plant asset records should cover the various classifications of these items so that depreciation rates may be established and insurance provided for. When these items depreciate rapidly, they should always be conservatively valued in the financial statements.

Records by Appraisal Companies

Where complete plant asset records are lacking, an appraisal is usually made at irregular intervals as a means of checking or adjusting the values as shown upon the ledger accounts. The first appraisal may be used as a basis for opening the plant asset accounts. Any important changes in the nature and value of equipment may be reported to the appraisal committee, and in that manner values may be kept up to date.

The changes in the value of equipment may be shown in statement form at the end of a cost period, and the management can then decide which items are to be capitalized and which are to be charged off against the current operations of the business. Often it will be found that additions and deductions from the established valuations are more closely scrutinized than the original valuations themselves. Under these circumstances it is advisable to take an inventory or to make an appraisal of the equipment so as to establish a basis for the proper accounting of these important items.

Part V—The Installation of a Cost System

CHAPTER XXIV

GENERAL CONSIDERATIONS

The Cost Accountant

Cost-finding methods are becoming more and more standardized as is indicated by the fact that many of the forms required to operate cost systems are sold by stationery houses. Notwithstanding the simplification resulting from this standardization, cost accountants will always be in demand for the reason that the detailed method of procedure in finding costs differs in almost every industry and to some extent in almost every plant and in consequence must be devised and installed by a competent cost accountant thoroughly familiar with the principles of cost-finding and the methods of compiling and summarizing cost data.

Among those engaged in cost accounting work, the first is the cost accountant engaged in public practice whose place in the commercial world is well established. Such an accountant acts as an independent advisor. His knowledge of the subject enables him to adopt a well-defined policy and lay out general plans which he knows will achieve the required results because they are fundamentally sound and correct and are backed by his own personal experiences in the practice of cost accounting. As his work to a large extent is supervisory, the details of the system may be satisfactorily planned by less experienced assistants or accountants engaged in the particular industry. The professional man is the teacher who lays the foundation for the complete system and procedure.

The professional cost accountant may be engaged for the purpose of devising and installing an entirely new cost system, or he may be consulted as to the necessity of making certain changes in the existing cost system. In either case his work is at an end when the system, finally installed, or corrected, has proved to be fundamentally sound in its operation.

The second, and equally important, type of cost accountant is the man who is employed by a concern as a permanent member of the organization. He devotes his whole time and ability to the cost problems of his concern and is held responsible for the successful operation of the cost system as a whole.

Work of the Cost Accountant

Most of the large enterprises of today are provided with cost systems. These enterprises are, however, constantly growing and developing, new lines of merchandise are being added, and new manufacturing methods installed. This means that their cost systems must be adapted to these changing conditions. New methods of compiling cost may need to be devised, existing methods must be modified, and perhaps mechanical office appliances may be advantageously used to eliminate detail work in cost compilations.

The cost accountant must know all the "best" ways of reaching these ends. Therefore, if he is to operate the cost system successfully he should understand the fundamental principles of cost-finding, and be able to revise and remodel his cost system when changes in manufacturing conditions make such alterations necessary.

Cost Classification of Enterprises

Most writers on accounting attempt to classify the various enterprises from an accounting standpoint, and some of these classifications are given here. The enterprises listed are divided into two groups, the first containing those classes

to which cost accounting systems are not applicable, the second covering industries in which cost accounting may be profitably employed. The first group includes the following classes:

1. Financial
2. Insurance
3. Professional

While ordinarily no cost systems are operated in connection with any of these enterprises, it is true that some dentists, doctors, and accountants keep cost records of a simple kind.

The second group in which a cost system, either in whole or in part, may enter into and form part of the accounting methods and system of each enterprise, includes:

1. Trading or mercantile businesses, such as retail, jobbing, and wholesale houses. In this class of business, costs are ascertained by departments. To do this it is necessary to keep complete stock records showing the money values of stock on hand, and also records showing the cost of the sales. This gives a basis for preparing periodical financial statements during the fiscal year.
2. Manufacturing industries, such as:
   (a) Metal-working plants
   (b) Wood-working plants
   (c) Textile plants
   (d) Paper mills
   (e) Chemical works
   (f) Paint and varnish plants
   (g) Boot and shoe factories
   (h) Garment factories
   (i) Shipbuilding plants
   (j) Garages, machine shops, and repair shops
3. Mining industries, such as coal, copper, silver, and gold mining.

4. Public utilities, such as railways, street railroads, electric light, gas, and water companies.
5. Governmental systems, which include the national government, and the various state, county, and municipality governments, with the various departments of each, such as the water supply department, police department, fire department, department of health, street cleaning department, etc.
6. Public and private institutions, such as colleges and schools, sanitariums, asylums, and hospitals. The management of these institutions usually requires some cost information to present to the board of directors or trustees as a gage of the efficiency of the management.
7. Miscellaneous enterprises, such as clubs, hotels, restaurants, building and trade contracting, breweries, real estate, and land development companies.

Internal Problems Affecting Cost Installations

Often the conditions existing in an industry have an important bearing on the devising and installation of cost systems. Not the least among these is the disposition of the manufacturer himself and his organization towards the cost system. It is absolutely useless to try to devise and install a cost system if it is going to be regarded with suspicion and criticism by those who are to operate and use it, before it has had a chance to prove its worth. To get the best results, the co-operation of the management and the entire organization is needed. One of the reasons for the failure of many cost systems is due to the lack of this co-operation.

To avoid executive opposition, before devising or installing a cost system the requirements of the management should be ascertained, and their desires be fulfilled so far as possible.

Among the working force the foremen and various department heads are often the most persistent objectors to a cost system, as they are likely to regard its installation as an invasion of their territory. They are right to the extent that the system provides an effective means of checking their work and measuring their efficiency in a way that cannot be done by personal inspection.

The most common shortcomings of a foreman are found in his failure to plan ahead properly and lay out work for the men under him, and the time and labor reports will often show his deficiencies in this respect. To illustrate, the time clock cards may show that the men were present 900 hours during a week, while the labor reports, which show the time spent on productive jobs, record but 800 hours for the same week. The discrepancy disclosed by this cross-checking of labor records is up to the foreman to explain. The objections of the foremen and the men may perhaps be overcome on the lines of the general basis of the general benefit of the system and its absolute fairness to them.

At times the accountant or accountants employed permanently by a particular industry who have established cost systems in their plant, feel that a new system, or suggested changes in a system, are within the scope of their individual work, and resent any suggestion from outside professional accountants which they themselves have not already considered. Since any changes in the cost department directly affect the work of the cost clerks and largely depend upon their co-operation for success, it is most essential to secure their good-will. A good plan, where possible, is to allow the cost clerks to suggest methods and changes. Credit for such suggestions, given where due, often aids materially in the successful operation of a cost system.

The good-will of the estimating department must also be secured, if possible. A cost system, if it operates properly,

provides an effective means for checking up the work of this department.

The sales department may object to the installation of a cost system if it involves changes in the method of pricing. Old-fashioned employees cannot get used to a new method of figuring costs as a basis for making a selling price. Often it will be advisable to allow the sales department to figure prices in both the old and the new way until the new methods prove their greater accuracy and value.

Fitting the Cost System to Existing Conditions

A special cost clerk is desirable when a cost system is to be installed. If the work is to be undertaken by the regular office force the system must be one they can handle, and when the clerical force lacks experience in such work, this necessitates a very simple system. More will be accomplished by generalizing results in such cases than by putting in a complete system, which is bound to break down because the clerical force cannot handle it. In other words, the cost accountant must work along the lines of least resistance and begin with as simple a system as possible, amplifying this and adding new features as the conditions allow.

Under such conditions it may be wise to introduce at first an "Estimating System," which is one of the simplest systems but one which will serve its own purpose and also soon show where more complete methods should be applied. The size of the plant and complexity of the work will, of course, have some influence on the system, both in the beginning and during its growth. It cannot be expected that an elementary installation will give satisfactory results where there are many varieties of articles manufactured, or where the processes are numerous or involved.

The growth of a system is not necessarily toward complexity. Very often, after a factory is well organized and

the efficiency work of the cost system is beginning to show results, features that were at first treated separately may be included in larger units and much detail labor avoided. The system at first must fit existing conditions; but one of the objects in view is to change conditions for the better, and when this is done the system itself may also be changed. Also, in some cases there are results that remain comparatively constant from year to year; and when the cost system has established the stability of these results by detailed methods for one or two years, the part of the system by which this has been done may be dropped and the results considered as a constant quantity. There is little benefit in verifying established data, especially if the verification is involved or expensive, or can be accomplished approximately by other means.

Red Tape

Whatever kind of system is devised, every precaution should be taken to avoid making it top-heavy. If there is one thing more than another that excites criticism of a cost system, it is red tape that does not justify itself in practical results. It sometimes shows itself in a mass of undigested reports, troublesome to make up in the shop and impracticable to use in the office, or it may take the form of volumes of data that no one ever consults. Another form of red tape, not uncommon, carries small items of cost to such a degree that the process of determining these costs is more expensive than the costs themselves.

In avoiding these pitfalls the cost expert will sometimes appear to be violating the fundamental principles of cost-finding, when as a matter of fact he is only preventing them from going to seed.

Reports for Executives

The systematizer must constantly keep in mind the practical objects and purposes of the cost system. The system it-

self is not the result; it is only the means by which results are obtained and these results must be adequately reported.

If the cost system is to measure shop efficiency, the records that will show these final results are the comparative analytical statements prepared at the end of every cost period. The efficiency comparison may be made by parallel columns or by comparing different sheets. Sometimes the various expenses are plotted on charts so as to show at a glance the upward or downward tendency.

The completeness of the expense classification depends upon the completeness of the system, and as stated before, this depends upon a number of considerations. In a thoroughly effective system the manager should be able to put his finger on any variation in any item of expense relating to any class of goods or to any department, and either know the cause of such variation or be able to investigate and discover it. Not only can variations be studied, but each item may be considered by itself with the idea of applying a remedy if needed. In short, an adequate series of reports of cost results serves as the key to the whole manufacturing situation, giving the management positive knowledge of the facts as they exist.

Summary of Cost Procedure

The summary of procedure in operating a cost system may be concretely presented as follows:

1. Charging the factory.
2. Receiving and storing material.
3. Proving and charging pay-rolls.
4. Delivering material to operation.
5. Compiling costs.
6. Crediting production.
7. Distributing factory overhead.
8. Charging production to stock.
9. Costing sales and shipments.

10. Preparing and posting the summarizing records.
11. Proving subsidiary records.
12. Preparing and proving the trial balance.
13. Preparing factory and financial statements.

1. Charging the Factory

The factory is charged with its material, and the labor and overhead involved in securing and storing this material and transforming it into finished goods. The material charges are obtained from the invoices and analysis of purchases record, or from the accounts payable vouchers and voucher register together with the distribution record or analysis record. The labor charges are obtained from the voucher register, supported by an accounts payable voucher, or from the pay-roll analysis. The overhead charges are obtained from the invoices, together with the purchase record or accounts payable vouchers and voucher register, supplemented by the distribution record or analysis record. These records should be supported by the detailed purchase requisitions, purchase orders, and report of materials and supplies received.

2. Receiving and Storing Material

The material is to be stored in the various storerooms and operating departments, and its quantity and value is recorded upon raw materials stores ledger accounts. The entries for this record are obtained from the invoices, supported by the report of material received, purchase order, and purchase requisition. A summary of material received may be prepared presenting the information in form for posting to stores ledger accounts.

3. Proving and Charging Pay-Rolls

Pay-roll records for paying employees are prepared from time reports and miscellaneous labor reports; and an analy-

sis of the pay-roll is prepared from the same detailed reports and proved to ascertain the departmental charges.

4. Delivering Material to Operation

Information as to transfers of material from stock and from miscellaneous storerooms to operation are obtained from material requisitions, departmental material records, stock transfer records, and miscellaneous material reports, these detailed reports being posted to the detailed stores ledger accounts. The same information is posted to the detailed cost sheets and miscellaneous cost records, including process cost records.

5. Compiling Costs

The compilation of costs includes the posting of material and labor reports, the details of which are transferred to the cost sheets or other cost records, including process cost records.

Provision must also be made for the departmental overhead affecting the various jobs, orders, or articles, and the overhead should be recorded upon the detailed cost sheets or other cost records. The compilation made upon these cost sheets and records, and the total cost of the job, order, or article should be thoroughly checked and compared with predetermined, estimated, standard, or previous cost.

6. Crediting Production

Provision should be made for summarizing the production and crediting the factory, at the same time distinguishing between good and defective work. Defective work, repair orders, and production orders should all be summarized. The detailed information for preparing the production summary is obtained from the miscellaneous production reports and the cost information from the cost sheets or miscellaneous cost records.

7. Distributing Factory Overhead

Items of overhead should be charged to departments. Non-productive departmental overhead and general operating expenses should be absorbed in the productive departmental overhead rates so that the overhead may be applied to the various jobs, orders, articles, or processes.

8. Charging Production to Stock

Provision should be made for summarizing the information in regard to production so that the charges to the various stock-rooms may be ascertained. The information for preparing these summaries is obtained from the production reports, the supporting cost sheets, and other cost records. The detailed items should be posted to the raw material, finished-parts stock, and finished stock stores ledger accounts according to the destination of the product.

9. Costing Sales and Shipments

The shipping orders and supporting invoices to customers should be costed and a summary prepared from these detailed reports. The returned merchandise received from customers should also be separately costed and summarized. This cost information may be obtained from the various stock records, cost sheets, or cost records. The merchandise shipped on consignment, and merchandise consigned and returned, should be treated upon separate records.

10. Preparing and Posting the Summarizing Records

All charges to the factory, transfers of material, labor, overhead items, and credits to departments, should be listed for the purpose of obtaining the totals to be posted to ledger accounts. The entries to the ledger accounts may be made directly from these summarizing records to the general or factory ledger, depending upon the method of control.

11. Proving Subsidiary Records

The various subsidiary records should be proved with the controlling raw material, work in process, part-finished, and finished stock accounts. A proof should then be made with the controlling accounts as kept in the general ledger, if a separate subsidiary factory ledger is kept.

If the stock records show perpetual inventories, provision should be made for testing every item of the different classifications of the merchandise inventory at least once during a fiscal year.

12. Preparing and Proving the Trial Balance

The trial balance of the factory ledger and general ledger may now be prepared, and all accounts should be in agreement with the various subsidiary records.

13. Preparing Factory and Financial Statements

The preparation of statements includes such financial and factory statements as the management desires. These may be supported by schedules when it is necessary to show more detail. Any special kind of statement desired may be prepared if the cost system shows a complete history of all factory transactions.

Cost Systems

Cost systems are of two kinds:

1. Estimated or predetermined systems
2. Complete cost systems according to the order method or process method of cost-finding

Predetermined costs are based upon estimated or standardized cost information obtained by means of fixed rates or percentages, or by means of complete standardized cost records showing the totals of the material, labor, and overhead costs.

Actual cost systems comprise job, order, and process cost systems. In some cases the last two methods may be combined. In other cases all three methods may be used in the same plant.

An examination of the plant should be made for the purpose of ascertaining the requirements and the system or methods of procedure to be used.

Forms for Cost Records and Reports

When it comes to the question of choosing or designing the forms to be used in any particular case, it is impossible to exercise too great care and foresight. The matter is one that cuts deeper than is apparent at the first glance. Fundamentally, a form is determined by the question, "What do I want to know?" Not only the form but the system to be adopted depends on the answer to this question. The next question is, "How can the facts best be obtained, summarized, and arranged, so as to get the most out of them with the least trouble and expense?" This cannot be answered until the type of system to be installed has been decided upon.

Any cost system should be so arranged that its several parts will fit into the scheme naturally and conveniently. Special forms need not be provided in all cases for summarizing purposes; in many cases summarizations may be made upon the same form on which the original data is compiled, and where this is not practicable, standardized columnar-ruled paper may answer the purpose. The forms for gathering the data at first hand should be designed with the idea of getting the necessary information accurately but with the least disturbance to the workmen and to shop routine.

Forms, as intimated, may be so arranged that they may be used for more than one purpose. This double purpose is accomplished either by making the form more general or inclusive in design, or by making extra copies. In actual practice, while the same forms may be used for different purposes

the same data should not be collected over and over again The forms as shown in the present volume sometimes overlap but this is because it is necessary to show what uses can be made of each form—not what uses should be made.

The forms submitted are limited in number and have been carefully selected rather as suggestions to work from than as examples from which to choose. The forms are not all shown with provision for binding but this can be easily supplied when necessary. Forms are most securely preserved if bound in a loose-leaf binder.

A careful inspection and comparison of related forms will often suggest minor changes that will adapt them to other systems. Adding a new column or changing the classifications will often enlarge the scope of a form more than would seem possible. No attempt has been made to explain all the functions that each design may perform, the object being to cover only its main functions.

Presenting Report on Cost Systems

If the services of a professional cost accountant are engaged to devise a new cost accounting system or a modification of an existing system, he should be asked to present a report containing the following information:

1. A general statement as to the purpose and scope of the new system, or reasons for changes in the existing system, together with the advantages and arguments in favor of the new methods as compared with the old methods.
2. An explanation in detail of all new forms, summarizing records, ledgers, and ledger accounts required. Instructions should be given as to the reasons for and methods of recording the cost data required and as to its disposition in each case. It should be stated by whom each record is to be

prepared and how it is to be handled, and finally, how the cost information is to be filed.

3. The forms to be used, drawn in their actual working size and presented in logical order, with their proper rulings and headings inserted.

It may be emphasized that the report should definitely describe the duties of each cost and factory clerk under the new system and the method of doing each portion of their work. Also, it is often advisable to submit a schedule showing the dates when the various summarizing records and reports to the executives and department heads should be ready. Such a schedule serves as a record for judging the efficiency of the members of the cost department, as it places the responsibility for preparing each summarizing record and report upon a particular individual.

After the above information has been presented and those interested have had time to give it thorough consideration, a conference should be held so that additional information may be given or any points which are not sufficiently clear in the original report may be elaborated. Any differences of opinion should be satisfactorily adjusted before the installation of a new system if any changes are made in an existing system.

CHAPTER XXV

INSTALLING A COST SYSTEM—EXAMINATION OF PLANT

Nature of Examination

The basis of any successful cost system must be sought in the manufacturing operations. This presupposes a physical examination of the plant in which a cost system is to be installed. It is not enough to inspect the books, as an analysis of the accounts and records cannot furnish all the necessary data. The extent and character of the information required is limited only by the boundaries of the business, and the classification of this information is a matter of the highest importance to the systematizer. He should have a definite plan of procedure and each question he may ask should have its definite place and object. In other words, the examination should be systematic and thorough.

The character of the information desired determines the scope of the examination. If a complete cost system is to be devised and installed the examination of the plant must obviously be more searching than if the cost accountant is merely to make suggestions for the improvement of existing cost-finding methods. However, it is always advisable to make a fairly thorough examination. Suggestions made after a partial or superficial examination are often found to be impractical because peculiarities of the particular industry which modify its cost accounting requirements have not been discovered.

The usual method of making an examination of a manufacturing plant for cost accounting purposes is to begin with

the receiving department, where the raw materials and supplies are received, and end with the office records. The cost accountant in charge should follow step by step from the receipt of raw material through each process of manufacture to the finished product, studying the method of storing the product at each point where a storeroom enters into the regular operation. The auxiliary activities of the plant, as they arise in connection with the manufacturing operations, must also be studied. Circumstances in each particular case will determine just where in the investigation the various productive and non-productive departments and storerooms should be considered.

The general method of cost-finding required in any particular plant will be suggested by the nature of the product and processes and one of the first steps must be to see that the lines are properly drawn between processes so as to provide for a working system of operating departments.

Examination of an Existing Cost System

In modifying or replacing an existing cost system the following matters must be considered:

1. Product classification.
2. Departments of the factory and the manufacturing processes in these departments.
3. Factory orders and method of starting the work in the various departments of the plant.
4. Raw material and storeroom requirements and the detailed material reports in use.
5. Labor and labor reports in use.
6. Departmental application of overhead items and the general distribution of the factory overhead, including reports which are necessary for recording this information.
7. Method of reporting production and the reports used.

8. Storeroom requirements for finished stock, finished parts stock, and reports incidental thereto.
9. Method of compiling the detailed costs, supplemented by a study of the cost sheets and other cost records.
10. Cost summarizing records, supplemented by a study of the methods by which the information is obtained for entry upon the various accounts affected.
11. The general accounting records which are used for the purpose of making the original entries.
12. The general accounting system in use, giving particular attention to the factory accounts.
13. The statements to be prepared, the general method of presenting them, and the results obtained by their preparation.

A general outline embodying much of the required information may be made at the first conference with the management and before the examiner inspects the factory departments. While the examination is being made, the examiner should consider the place of each feature in the cost system and what special modifications are needed to make the system fit the conditions as they exist. He must at all times watch for any other data that may help him in suggesting changes in the system, and note carefully any defects and inefficiencies disclosed by his examination.

It must not be thought, however, that the examination itself will discover anything more than "surface" defects; it remains for the modified cost system, when it is finally installed, to detect and locate all inefficiencies which lie beneath the surface.

Also a watch should be kept for leaks, especially in places where they may exist unnoticed. Lost or spoiled material and idle time are among the more prominent and more costly leaks. Large losses are sometimes incurred by the failure to

completely check material received, as in cases where barrels are not opened to see that they are full. Spoiled material is likely to be concealed if the method of reporting production is not good. Time may be lost through poor management on the part of foremen, especially where the departments are not well balanced and where the men in one department wait for work from another department.

Time lost in carrying materials, crowding of aisles with goods, scattering of men's time on odd jobs, unnecessary consumption of power, waste of scrap material, inconvenience in location of tools and dies, poor wash-room and toilet facilities, are all items that should receive attention, as losses are often incurred which, although small in any special case, are considerable when spread over the whole factory.

The examiner should also take note of all places where the work seems to be going on in a half-hearted manner. Such work will require attention, and perhaps special measures, but the better results secured will well justify it. Matters of heat, light, and ventilation are most important; bad air makes the men dull and listless, and often causes the production of an entire department to drag.

Efficiency Details

In any examination in addition to collecting constructive information for the purposes of his installation, the cost accountant should constantly watch for possibilities of increasing efficiency. These might include such things as the improvement of wage systems; improvement in arrangement of the plant; improvements in the routine manner of handling machines; removal of congestions in the various departments; improvements in the method of storing raw materials, supplies, and various items composing finished stock; suggestions as to the method of handling tool room records; suggestions as to plant asset records.

Procedure for Examination of a Plant

It is suggested that the cost accountant examining a plant have with him a schedule of procedure which will enable him to classify his information and keep him from overlooking important details. The suggestions which follow, while suitable for this purpose, are not expected to cover every possible condition. The examiner in charge will be able, however, in any case to cover a large portion of his investigation by using these queries and suggestions and may supplement them with additional information whenever necessary. It is impossible to obtain information in too great detail.

1. Product Classification

The catalogue and other advertising literature published by the company, including circulars of a descriptive character, often furnish the basis for a complete product classification. Additional information may be obtained from the sales records or any finished stock records which may be kept. If product classifications are lacking, the following procedure will supply the deficiency:

(1) Obtain description of all product sold, whether manufactured or purchased to be sold in its original state. (A distinction should be made between product manufactured and product upon which no manufacturing operations are done.)

(2) Supply or suggest headings for the main divisions of the product manufactured.

(3) Supply or suggest subdivisions which may be used under each of the main divisions if a more detailed product classification is desired.

(4) Obtain views of the executives of the sales department, purchasing department, accounting department, and production manager, on the product classification which is contemplated.

(5) Obtain catalogue if one is in use.
(6) Any additional information that may be helpful.

2. Sales Department

(1) Ascertain manner of selling product.
(2) Ascertain amount of sales annually.
(3) Are sales evenly distributed over the year, or are they seasonal? If so, why?
(4) Are sales classified, and if so, how?
(5) Are any branch warehouses, offices, or agencies maintained? If so, how handled?
(6) Any mail order business? If any, under what plan?
(7) Any retail department? How handled?
(8) How many salesmen employed—on salary or commission?
(9) Any records of salesmen by territory?
(10) Any records of profits on sales of each man as above?
(11) Any statistics as to sales and salesmen; are they compiled regularly or only at intervals?
(12) Any advertising plan? Obtain description of it and the records kept.
(13) Obtain description of follow-up system, if any.
(14) Obtain description of filing system.
(15) Obtain description of freight rate records, if any.
(16) Obtain list of office force and duties of each.
(17) Obtain copies of all forms or books, including route lists, salesmen's reports, expense accounts, quotation records.
(18) Any additional information.

3. Departments of the Factory and Manufacturing Processes

The underlying purpose of an organization is to bring each and every activity of the plant under the notice and con-

trol of the men responsible for its proper operation. Thus, each department should be considered in its relation to the preceding and succeeding departments, and the methods by which its operations and production are reported and controlled should be carefully studied.

As far as possible, each productive department should be limited to single operations in order to provide an intelligent basis for compiling the costs. The information relative to the machinery should include cost, floor space, and in fact all data necessary for the calculation of assignable factory overhead items. In considering the distribution of the power cost item, it should be determined whether tests for power have ever been made and if so whether the conditions make it desirable for the tests to be brought up to date.

The general arrangement of the departments and the machinery should be examined very closely with the idea of making all processes as continuous as possible. Much time and money are wasted in rehandling material when machines are badly placed in regard to each other.

The average and minimum efficiency of the machines should be ascertained, and whether they are automatic or otherwise. This latter point is often important in arranging details for gathering and compiling costs. If a machine rate is to be used, the examination should be unusually detailed and thorough.

All manufacturing processes and operations should be specifically designated. If the names of the operations are not definite enough in themselves to suggest the exact nature of the manufacturing process, a detailed description of the process or operation should supplement each name.

A request for the following data will furnish detailed information as to the operating conditions in the plant:

(1) How many plants are in operation and where are they located? Obtain description of them.

(2) Are any other plants controlled by this concern?

(3) If possible, obtain sketch of floor space of plant and indicate space occupied by each department. Obtain blue-print if it may be had.

(4) Obtain land area and ascertain how it is occupied.

(5) Is plant owned or rented?

(6) Could plant be improved as to arrangement without any material expense?

(7) Ascertain whether a maintenance record is kept for buildings, machinery, and equipment, and if so, obtain detailed explanation of the method of keeping and using the record.

(8) Get name of each department.

(9) Get name of the foreman or supervising head of each department.

(10) Ascertain number of employees, classified as to productive and non-productive workers.

(11) Ascertain method of paying wages, classifying piece-workers, day-workers, bonus-workers, premium-workers, etc.

(12) Does the foreman appear to be competent? What are the duties of his assistants and of the department clerks?

(13) Are instructions given to the department employees verbally or in writing?

(14) Are blue-prints, drawings, models, and sketches furnished in all cases where desired?

(15) Obtain list of machines in the departments and the different processes and labor operations in use.

(16) Where the name of the machine does not clearly indicate its purpose, obtain description. Also ascertain which are automatic or semi-automatic, and get description of groups when they are operated by one person or a team.

(17) Obtain complete description of any machines which are obsolete or inefficient.

(18) Are machines arranged to the best advantage for economical operation? Suggest improvements.

(19) Are there high-speed machines or tools used? If so, obtain description.

(20) Are the machines operated as rated by the makers or have any attempts been made to increase their efficiency?

(21) Are there any counters upon any of the machines? If so, on which? On what other machines might counters be useful?

(22) If tempering or heating or drying furnaces are in use, ascertain their purpose and obtain full description. Also ascertain kind of fuel used, and any items of cost peculiar to each furnace.

(23) Are all machines numbered?

(24) Is there a separate tool room, and how are tools obtained and followed when they are used by different employees?

(25) What is method of numbering and cataloguing tools?

(26) Do workmen keep own tools in repair, or is there a toolmaker employed for that purpose?

(27) Are machines and transmission appliances guarded to protect employees against accident?

(28) Are there any tool or pattern maintenance records?

(29) Are there any efficiency records in connection with either men or machines?

(30) What sort of power is employed, and how distributed; i.e., by individual motors, group motors, a single motor, or direct from line shaft?

(31) Is there any record of power cost either for departments as a whole, or as applied to machines?

(32) Is natural lighting good? If deficient, why? If possible, suggest improvements.

(33) Obtain complete list of operations performed in each department, indicating hand and machine work; also descriptions of any that are exceptional and peculiar.

(34) Are operations standardized as to time, machines, speed, tools, etc.?

(35) Are there any defective methods of performing operations? Suggest improvements, if possible.

(36) Obtain description of time-keeping system and method of reporting labor cost information.

(37) Is there any lost or idle time? If so, why?

(38) Obtain description of bonus or premium system in force.

(39) How are materials obtained and charged to production?

(40) Is it necessary to issue materials in excess of immediate requirements at times? If so, how is the excess cared for?

(41) How is defective work reported and disposed of?

(42) Are there any methods to check the replacing of materials that have been spoiled?

(43) Do requisitions for replaced material indicate the purpose of the withdrawal?

(44) Is there any undue waste of material or time? If so, suggest remedy.

(45) How is legitimate waste material disposed of? If used again, how?

(46) Is all work properly tested or inspected?

(47) Is work inspected by operation, or only when entirely completed?

(48) Are there any delays in departments due to faults of other departments? If so, what are they?

(49) Is any attempt made to regulate the degree of humidity in departments? How are they ventilated?

(50) If manner of reporting production or progress in any one department differs in any way from others, ascertain the difference. If production is checked, learn method in use.

(51) How are parts belonging to repair jobs stored and marked?

(52) Are any samples made for showrooms, demonstration, or salesmen? If so, how handled as to accounting?

(53) Is there any friction or dissatisfaction of any sort? If so, what is it?

(54) Do the departments appear to be efficient as a whole, or is there an indication of laxity?

(55) Obtain copies of all forms.

(56) Any additional information.

The above information should be obtained for each department of the plant so far as the suggestions apply. Any additional data which is necessary to cover peculiar requirements incidental to a special department or plant should be obtained. Some of the special departments which should receive particular attention are mentioned in the paragraphs which follow.

4. Foundry Department

In the case of the foundry department, the same inquiries as used for manufacturing departments may be applied so far as they will fit. In addition the various classes of molding should be ascertained, viz., machine, snap, floor, pit, regular bench, etc., as well as the different classes of output, the character of mixtures, and other information, as follows:

(1) Do mixtures vary in the same melt?
(2) What is number of melts per week?
(3) What is cleaning process?
(4) What is manner of making calculations at present?
(5) What is manner of ascertaining production and waste?
(6) Is work planned in advance?
(7) Are flasks, rigging, and tools cared for and placed conveniently for use?
(8) Are iron or wooden flasks used?
(9) Are there any special methods of molding?
(10) What is condition of cupolas, furnaces, or other equipment, etc.?

5. Plating Room

The same inquiries as for manufacturing departments may be used for the plating room, wherever applicable. Information should be obtained as to whether anodes or salts are used, and how consumption and amount of deposit is ascertained. Any special processes should be noted, and also the number of small pieces immersed in one hangar, the difficulties, etc.

6. Wood-working Shops

In wood-working shops the line of investigation outlined for manufacturing departments should be pursued, bearing in mind that wastes and consumption of material are the most puzzling features of such plants. Information should be obtained particularly from an accounting standpoint as to the methods employed for determining consumption of materials and the treatment of wastes suitable for further use.

7. Dry Kilns

(1) What is type of kilns used; that is, direct heat or vapor process?
(2) What is equipment and manner of operating?

(3) Is exhaust steam or live steam used?
(4) Is lumber measured or weighed in and out? If not, how is quantity dried accounted for?
(5) Obtain information as to special fire protection, if any.
(6) How far away from factory buildings are dry kilns located?
(7) Is any attempt made to record cost of drying? If so, obtain particulars.
(8) Ascertain number of employees and their duties.
(9) Obtain copies of all records.
(10) Any additional information.

3. Power Department

(1) Obtain list of equipment fully described as to kind and capacity of engines, boilers, dynamos, pumps, heaters, condensers, etc., as well as to the condition of the equipment.
(2) How frequently are boilers cleaned?
(3) Is there any reserve capacity?
(4) Is equipment deficient in any respect? If so, how?
(5) Are there special safeguards against accidents?
(6) Is power plant in one unit? If more than one unit, obtain description of each unit separately.
(7) Are all buildings heated from the central power plant?
(8) Obtain description of the records showing power and heat distribution.
(9) Obtain description of records which show the distribution of light.
(10) Obtain description of any record which may be kept for air distribution.
(11) Obtain description of any records which may be kept for engine efficiency.

(12) Obtain description of records showing fuel consumption.
(13) Obtain description of records showing the consumption of miscellaneous supplies used.
(14) Is exhaust steam returned to boilers?
(15) How many employees are there and what are the duties of each?
(16) Obtain copies of all records.
(17) Any additional information.

9. **Packing Department**

(1) May this department be considered a productive or a non-productive department?
(2) What sort of package and what kinds of packing materials are used?
(3) Are packages manufactured or produced?
(4) How are packing materials, including nails, twine, wire, etc., obtained?
(5) Obtain description of records which show consumption of materials.
(6) How are values of the various materials obtained as applying to each particular shipment?
(7) Ascertain number of employees and their duties.
(8) How is time and labor cost recorded and applied?
(9) How are deliveries made to shipping department, and how accounted for?
(10) Obtain description of machines or mechanical appliances which are used.
(11) Obtain copies of all forms used.
(12) Any additional information.

10. **Shipping Department**

(1) How are shipments checked out?
(2) What is relation between factory and sales orders?

(3) What records are kept and what reports are made to the cost office and general office?
(4) Are shipments made from own siding or trucked to railroad stations?
(5) How are partial shipments handled and recorded?
(6) What mechanical aids are used?
(7) How many employees are there and what are their duties?
(8) Obtain copies of all forms.
(9) Any additional information.

11. Estimating Department

The organization of this department should be considered, and its relation to the cost, sales, and other departments of the organization should be fully described.

(1) Ascertain number of employees and the duties of each.
(2) Obtain full description of the methods of making estimates.
(3) Obtain description of the system in use for checking estimates as to material, labor, and overhead costs.
(4) Obtain copies of all forms.
(5) Any additional information.

12. Cost Department

Where a cost department is operated, a thorough examination of all work done by this department should be made.

(1) Obtain a list of the names of all clerks and a full description of the work done by each.
(2) Obtain a list of all forms and records in use together with the information contained in each and the purpose of each.
(3) Obtain complete information as to the various re-

ports rendered to different executives and department heads. Obtain description of each report in detail and its purpose.

(4) Ascertain the provision for filing the various forms and disposition of the detailed reports and records.

(5) Any additional information.

13. Factory Orders

(1) Obtain description of the various kinds of factory orders in use.

(2) What is method of preparing orders?

(3) Ascertain number of copies of orders issued and how they are sent to the various departments of the plant.

(4) Obtain full description of the information contained upon each copy of the factory order. How is each copy used and what is its final disposition?

(5) Who is responsible for the issuance of factory orders and how are they issued?

(6) Is an order department maintained as a separate department of the organization?

(7) How are factory orders registered?

(8) What is the relation between sales orders and factory orders?

(9) What is the relation between factory orders and shipping orders?

(10) Obtain copies of all forms used in connection with factory orders and registering of same.

(11) Any additional information.

14. Raw Material and Storeroom Requirements

How raw material is received, checked, stored, and put into operation should be noted carefully. It may then be followed through the factory step by step until it is transformed

into finished stock. The minimum and maximum quantities necessary should be known, and the disposition or utilization of the waste and scrap material should also be looked into carefully. The item of by-products should receive special attention.

The methods of storing raw material and part-finished stock and the possibilities of improvements should be considered. If a stock system is not in use, there is no other place where leaks are more likely to be found than in the storeroom. Every business man insists that his cash be accounted for to the exact cent, yet it is not uncommon in a badly organized plant to see hundreds of dollars' worth of material scattered about without any method of safeguarding it or accounting for its use. The expense and trouble of keeping stock records are usually saved many times over by the saving in stock and the practical convenience of being able to tell at any time exactly how much stock is on hand and where it is located.

Each stock-room should be examined, as it is necessary to handle bulk materials, such as pig iron, lumber, etc., separately from the smaller material items. In connection with raw material, the purchasing department, receiving department, and storeroom requirements should all receive attention.

15. Purchasing Division

(1) Are purchases made on verbal or written requisitions? Obtain full particulars.

(2) Is there any one responsible head, or are purchases made by several different people? Obtain particulars.

(3) Are complete records made of quotations received?

(4) Is any accounting done in this division? If so, what?

(5) Ascertain filing methods, including filing of catalogues and price records.

(6) Are any orders placed verbally? If so, are they promptly confirmed in writing?
(7) Obtain copies of all forms and books used.
(8) Obtain list of names of office force, with duties.
(9) Any additional information.

16. Receiving Department

(1) How are incoming goods handled?
(2) Are there any mechanical appliances? Obtain description.
(3) What records are maintained?
(4) Is there a track scale and a car record kept? If not, how are car loads received and checked out?
(5) How are partial shipments checked up and reported?
(6) Is trucking equipment owned? Of what does it consist?
(7) Obtain copies of forms, books, etc.
(8) If any goods are returned, how is accounting handled?
(9) How are overs, shorts, or damaged goods reported to purchasing department?
(10) Any additional information.

17. Storeroom

(1) Are storerooms maintained for all raw materials and parts?
(2) How many storerooms are there, and where located?
(3) Do many factory employees have access to stores?
(4) Are heavy goods conveniently arranged as to classes and convenience of handling? Are they properly marked or tagged, and are there signs or other methods for locating classes?

(5) Are there any mechanical devices such as trolleys, tiering machines, cars, etc.? If so, obtain description.

(6) Are there bins, shelves, racks, etc., of sufficient capacity, and are they arranged to best advantage for economical handling of goods?

(7) Are bin cards used?

(8) Are parts manufactured and carried in stock?

(9) Could any such parts be purchased for less money?

(10) Is raw material carried in stock after passing through a process? If so, ascertain reason and obtain description.

(11) How is the quality of goods tested when received?

(12) What checks are maintained as to correctness of deliveries to manufacturing departments?

(13) How are such deliveries made, and are there tote boxes or other standard devices used?

(14) Are all deliveries covered by requisitions? If not, what are the exceptions and reasons therefor?

(15) Does storekeeper have copies of all standard bills of material or specifications?

(16) Are factory supplies furnished to departments on requisition? If not, how are they handled?

(17) Are obsolete parts or surplus stock reported regularly to the management?

(18) How are returnable containers handled and accounted for?

(19) How does storekeeper request purchases?

(20) Is a perpetual inventory record maintained, and if so, how verified?

(21) Does such inventory record show quantities only or values and costs as well?

(22) How many employees are there, and what are their duties?

(23) Does the department appear to be efficiently handled?
(24) How does storekeeper handle excess materials issued and returned to stores?
(25) Obtain copies of every form or record.
(26) Any additional information.

18. Labor and Labor Reports in Use

The number of men occupied in productive and non-productive work should be recorded for each department of the plant, and the entire labor force should be classified as to the operations and different processes if it is possible to do so. The various systems of paying wages should be fully described in connection with the different products manufactured.

Most of the information in regard to the labor cost will be obtained in answer to questions relating to the different manufacturing departments.

(1) Obtain a copy of each report in use.
(2) What is method of recording labor information, what use is made of it, and what is the final disposition of information and detailed reports.
(3) Ascertain method of preparing pay-roll and obtain a copy.
(4) What is method of paying wages to employees? Obtain copy of the receipt form, if same is required from employees.
(5) Obtain full information as to method of preparing pay-roll analysis.
(6) Procure names of the clerks in the pay-roll department and ascertain the duties of each.
(7) Obtain full description of the method of checking the work in the pay-roll department as well as the check as to the system of paying wages.
(8) Any additional information.

19. Factory Overhead Items

Provision should be made for classifying all factory overhead items so that as many as possible may be applied directly to some definite department. The basis of apportioning each such item should be fully described.

Much of the data relative to the amounts composing the factory overhead may be obtained from the accounts kept in the general and factory ledgers. If an analysis of detailed overhead items is not complete enough, any suggested changes should be discussed with the management and head of the accounting department. Where the accounts are well arranged, they may present valuable overhead information which would otherwise have to be determined by estimate or experiment.

In establishing the methods of distributing factory overhead, detailed information is necessary for ascertaining the various percentages and rates.

(1) Obtain a list of all factory overhead items.
(2) Ascertain the relation of each item to the various departments of the plant and various products manufactured.
(3) Obtain full description of the method which is now in use for distributing the factory overhead items to the various departments of the plant.
(4) Ascertain the method of applying the factory overhead to the cost of the job, order, article, or process.
(5) Obtain description of the method of providing for overhead when preparing estimates for new business.
(6) Obtain copies of all forms relating to factory overhead items.
(7) Any additional information.

20. Production

The production will also be considered as each department is examined. The classification of the product and the classification of the factory orders will indicate the kind of work done by the different departments. In considering production, the following information is desirable:

(1) Obtain full information as to the method of reporting production to the office and cost department.
(2) Ascertain the method of transferring production to the various stock-rooms.
(3) Ascertain the method of checking the production information as reported by the manufacturing departments.
(4) What is the relation, if any, between the production and the packing and shipping department information?
(5) Ascertain how special production is handled, if it is treated differently from the standard product manufactured.
(6) Obtain copies of all production forms and description of the use of each.
(7) Any additional information.

21. Finished Parts and Finished Stock

The questions dealing with the raw material storerooms apply also to the requirements as to the finished stock and finished-parts stock items.

(1) List the various stock-rooms and the location of each.
(2) How is the product placed in stock and how is it requisitioned from stock?
(3) Ascertain the relation of the stock-rooms to the

operating departments of the plant as shown by the production reports.

(4) Ascertain the relation of the stock-rooms to the packing or shipping departments as shown by the shipping records.

(5) Obtain full description of the method of keeping bin records if same are in use.

(6) Ascertain how stock transfers are made.

(7) What are the requirements as to obsolete stock items?

(8) Obtain complete description of stock records, and if values are entered, description of the method of costing the various items upon the records.

(9) Obtain copies of all forms.

(10) Any additional information.

22. Compiling the Costs

(1) Ascertain the method of transferring information as to the material cost from the detailed material reports.

(2) Ascertain the method of transferring information as to labor costs from the detailed labor reports.

(3) Ascertain the method for providing for overhead cost.

(4) Ascertain the method of keeping track of the production reported for each factory order.

(5) What is the method of checking, comparing, and verifying costs as compiled upon the cost sheet or other cost record.

(6) Obtain copy of cost sheet or other cost records and ascertain purpose for which each record is used.

(7) Obtain copies of all process cost records.

(8) Obtain copies of all cost records which are compiled as a basis for setting rates or standardizing costs.

(9) Obtain copies of all other cost forms with description of the use of each.
(10) Any additional information.

23. Cost Summarizing Records

Secure full description of summary records dealing with:

(1) Charges for material.
(2) Labor charges, both productive and non-productive.
(3) Charges for factory overhead items.
(4) Transfers of material.
(5) Transfers of labor.
(6) Distribution of the factory overhead to the various departments of the plant.
(7) Miscellaneous adjusting entries. (All adjusting entries should also be fully described, and it may be necessary to make an examination of several months' transactions which show adjustments.)
(8) Methods of reporting production.
(9) Shipments of merchandise.
(10) Return of merchandise to stock.
(11) Obtain copies of all forms and complete description of the use of each form not dealt with in the preceding queries.
(12) Any additional information.

24. General Accounting Records of Original Entry

(1) Obtain copies of all general accounting records which have not been considered previously, with descriptions of their use.
(2) Ascertain the connection of each record with the cost summarizing records.
(3) Ascertain the name and all the duties of the clerk keeping each record.
(4) Any additional information.

25. **General System of Accounting**

(1) Obtain a complete list of all private ledger, general ledger, and factory ledger accounts.

(2) Obtain full description of any system of symbols or account numbers in use.

(3) Ascertain the duties of the clerks who keep the private, general, and factory ledger accounts.

(4) Ascertain the method of preparing trial balances and balancing them with subsidiary supporting ledgers and records.

(5) Obtain information regarding the method of checking the valuations of plant assets.

(6) Obtain the viewpoint of the management in regard to the contemplated changes in the ledger accounts.

(7) Obtain copies of forms of accounts, noting if any accounts are of a special form. Obtain description of those of a special character.

(8) Any additional information.

26. **Statements**

(1) Obtain the list of the financial and factory statements which are prepared at the end of a fiscal period. If possible, obtain a copy of these statements showing the financial condition and results.

(2) Obtain copies of the factory and financial statements prepared at different times during the fiscal year.

(3) Ascertain fully the method of preparing each statement, and the source of its information.

(4) Ascertain the duties of all clerks who prepare statements which are submitted to the management.

(5) Ascertain fully the purpose for which the statements are used.

(6) Obtain the opinion of the management as to what additional statements might be desirable.
(7) Any additional information.

27. Miscellaneous Information

While the preceding queries and suggestions cover the information required for use in the installation of complete cost accounting methods, it is often desirable in the interest of efficiency to obtain further details as to the work of the organization. For example, it may be discovered that some of the general clerks are able to handle certain cost work in addition to their regular duties. Therefore, the investigation should cover the following general office and accounting work:

(1) Method of handling mail and correspondence.
(2) Method of handling and controlling postage stamps.
(3) Filing system in use.
(4) Card index system and method of handling.
(5) Divisions of the administrative organizations and number of employees in each.
(6) Description of any forms or records which have not been already considered.
(7) Billing system in use and method of preparing invoices for customers.
(8) Collection methods in use and description of records.
(9) Stationery records and condition of stationery stock.
(10) List of all forms which are not being actually used at the time the examination is made.
(11) Method of using each of the forms which have become obsolete.
(12) Standard of clerical work and whether there is any provision made for keeping work up to date.

(13) Objections offered against introduction of improved accounting and efficiency methods.

(14) Method of handling experimental work.

(15) Method of guarding against strikes or other labor troubles.

(16) Method of taking inventory at such time as financial records are closed. This should include a full description of the method of counting, listing, and obtaining an inventory, together with the method of pricing the raw material, work in process, finished-parts, and finished stock items.

(17) Method of making inventory tests, if any are made during the fiscal year.

(18) Method of adjusting accounts and records if the test shows discrepancies in inventory items.

(19) Method of recording cash sales, obtaining copies of all records which should show this information.

(20) Method of treating small orders received from various customers and how same are billed if they are treated specially.

(21) Method of recording the information as to cash purchases, obtaining copies of records relating to same.

Examination of Auxiliary Mechanisms

Besides the examination of the regular machinery used in the manufacture of the product, attention should be directed to auxiliary mechanical service, which is a very important factor in running a shop to the best advantage. This field covers a wide range, but the following are suggested: time clocks, time stamps, patent time cards, carrying belts, automatic counters, arrangements of yard service, factory telephones, standard jigs and dies, special arrangement for heavy or peculiar tools,

mechanical devices in the office, such as adding machines, multiplying machines, slide rules, sorting machines, pay-roll machines, tabulating machines, etc.

Method of Obtaining Information

It is apparent that the information to be gathered by the examination outlined depends to a large extent upon the size of the business, and that it should be obtained only as fast as it can be digested and analyzed. A satisfactory plan is for the examiner to spend the forenoon of the day in examining one or more departments and their records and in making the necessary notes as the answers to queries are received. The afternoon of the day may be utilized in writing up in detail the results of the morning's work. Thus, it is possible to review the work done in the forenoon while the details are still fresh in mind and to add any information that may have been overlooked in the first place. In providing for changes or new systems, so far as is practicable the existing methods should be incorporated in the new and the work thus planned along the lines of least resistance. Often one or two changes in a form in current use, or in its headings, or an extra column or two, will furnish a basis for supplying additional information required so that accurate cost data may be gathered.

CHAPTER XXVI

INSTALLING A COST SYSTEM—METHOD OF STARTING OPERATIONS

Preliminary Test of Records

No general statement would cover the various matters which should receive first attention when a cost system is being installed. The exact starting point will depend, to a large extent, upon the kind of industry and the manufacturing conditions peculiar to the business under consideration. In general, however, it may be said that the forms, records, and methods to be used should all be prepared and tested before the date when actual cost compiling begins. For example, the records may be used by the factory and office employees for a period of a week or two merely with the object of "trying them out," which would enable the personnel to become thoroughly familiar with the method of keeping each form and record and the method of reporting the information. This is particularly important in so far as concerns the detailed material, labor, and production reports, as these records originate in the factory and are prepared in part or in whole by factory employees who may be unused to clerical work of this kind. The methods of summarizing the various items of cost may be postponed until the actual reports begin to come in from the factory departments, which is always a day or two after the cost system is started.

Full and complete instructions should be given to every official and clerk in any way concerned with the operation of the system, and these instructions should be supplemented by copies of the forms and records which each person is re-

quired to handle. All differences of opinion and doubts in the minds of the executives and clerks responsible for the system should be properly adjusted before the actual cost work begins. It is true that time may not in all cases permit extensive preparation, but in a large number of instances, when a cost system is installed in a hurry, it fails to work satisfactorily and is in consequence condemned before it has been given a fair trial. Lack of preparation, and a lack of knowledge of the proposed methods on the part of employees, are frequent causes of its failure.

Order of Procedure

Assuming that all necessary preparatory work has been done, the next procedure is to take up in logical order the steps necessary to get the system working in its full stride. In summarized form these would consist of the following operations:

1. Classifying and reanalyzing the beginning inventory.
2. Entering inventory upon the records.
3. Starting new orders in the factory.
4. Overhead distribution.
5. Classification of the product, departments, and accounts.
6. Reports and records.

Classifying and Reanalyzing the Beginning Inventory

If the last physical inventory has been taken and classified with a view to the installation of a cost system, a reclassification or reanalysis may be unnecessary. However, in most instances, it will be found that no attention has been given to the matter. The importance of an accurate physical inventory has already been repeatedly emphasized. Cost accounting deals principally with keeping track of the items composing this inventory, and therefore, being the basis of

the whole system, too great emphasis cannot be laid upon the fact that it must be as accurate as possible.

The analysis of the inventory is necessary, as already stated, so that the various controlling accounts for raw material, work in process, finished parts stock, and finished stock may be started with the proper beginning balances. The details which make up these balances should always prove and be in agreement with the total amount as shown by the actual physical inventory.

The raw material items are subdivided into different classifications when separate controlling accounts are established for the various materials and supplies items which compose this portion of the inventory. If a separate controlling account is kept for each operating department, it is necessary to reanalyze the work in process so as to ascertain the costs chargeable to each department. Often a proof is made of the elements of material, labor, and overhead charged to departmental work-in-process accounts, and this proof may necessitate a further subdivision of the details. The finished parts stock items may be controlled by several accounts, depending upon their classifications. Therefore, it may be necessary to analyze these inventory items so as to ascertain the total amount applicable to each class of finished parts on hand. The same procedure is applicable to finished stock. Where the inventory consists of several hundred sheets and no previous attempt has been made to classify the items, the analysis will involve much clerical work, on which it may be necessary to employ a special corps of clerks.

After the inventory has been reclassified and the analysis proved, the controlling totals can then be obtained and the balances entered in the different raw material, work in process, finished parts, and finished stock accounts. These, as previously stated, may be kept either on the general ledger or in a separate subsidiary factory ledger.

Entering Inventory on Records

When a complete cost system is in operation, all controlling accounts are supported by subsidiary stores ledgers and cost records. Therefore it is necessary to provide for entering the detailed items of the raw material, finished parts stock, and finished stock upon stores ledger accounts and the work in process items upon cost sheets or process cost records. Frequently it is necessary to keep separate accounts for each style, grade, size, and kind of material. These stores ledger accounts should all be started with the quantity on hand as shown by the beginning inventory.

If valuations are entered on the accounts, the price per unit of measure and total cost for the quantity on hand must be recorded. Where the raw material items are controlled by several controlling accounts, the different sections of the stores ledger are classified accordingly in separate binders, or in separate drawers or cabinets if cards are used. Exactly the same procedure is applied to the classification and control of finished parts and finished stock or product.

Proof of Entries

After the entries have been made upon the raw material, finished parts, and finished stock stores ledger accounts, a proof should be made of the quantity and the amount entered thereon. This proof is established by adding the balances shown upon the accounts by means of an adding machine and proving it with the analysis of the merchandise inventory for each section, this analysis being in agreement with the summary of the merchandise inventory.

While the stores ledger accounts in the subsidiary ledger constitute the main office records, bin records may be kept in addition to these. Where this is done the quantities shown upon the stores ledger accounts must also be entered upon the detailed bin records for each item composing the raw material,

finished parts stock, and finished stock items. A proof should be made of the bin records by comparing the information shown thereon with that shown on the stores ledger accounts.

Handling Work in Process Items

In handling the work in process items, if the order method of cost-finding is used, every job in process at an inventory date should be given a definite number. A cost sheet should then be started for each job, and its total cost, as shown by the analysis of the merchandise inventory, should be entered upon its cost sheet. A proof should be made by adding the details shown upon the cost sheets and comparing the totals with the balances in the various work in process controlling accounts.

Where the process method of cost-finding is used, all articles in the operating departments should be grouped, first, according to the classification of the product, and secondly, according to stages of completion. Provision must be made for checking the total cost of this work in process from inventory date until it is finally completed. This may be done in two ways. One method is to enter an order for each kind of product or article in process in the various departments and follow the orders through as under the order method until completed. Another method is to convert the work in process at inventory date into raw material or finished parts stock, analyzing upon process cost records the material and labor costs in each case.

If cumulative costs are to be transferred from department to department, they may be summarized and entered upon various departmental cost records without the necessity of entering any details upon separate process cost records.

Starting New Orders in the Factory

All items composing the merchandise inventory should be entered upon various subsidiary records which are con-

trolled by the factory accounts kept in either the general or factory ledger. The work in process at inventory date should be definitely designated so that the detailed reports will cover all items of uncompleted product. Provision must also be made for definitely designating the new orders to be started.

The required number of order copies should be determined during the preliminary discussion prior to the date of starting the cost system. If the order method is to be used, all work must be definitely designated by distinctive factory order numbers or job numbers. If the process method is employed, the product should be distinguished by names or numbers allotted to the different lots or batches and to each operation or process.

Cost sheets should be prepared for each job, order, article, or process, distinguished under the order method by the job or order number, and under the process method by the names or numbers of the processes or operations. Each day, as the material, labor, and production reports are received, the information contained on them is transferred to the cost sheets, process cost records, or other cost records. The posting of these records covers a large part of cost accounting procedure. The detailed reports should be summarized, proved, and analyzed as to the charges and credits for the various accounts affected.

Overhead Distribution

In cases where cost methods are being adopted for the first time, fixed rates or percentages for the distribution of factory overhead usually will not have been considered or determined. Assuming that the precise methods to be used have been decided upon during the preliminary conference preceding the installation of the cost system, it will then be necessary to obtain certain data from the accounting records of previous periods before departmental rates or percentages

can be compiled. This work often involves a thorough examination and analysis of the accounts, which should be proved with the prior financial statements and trial balances.

After proving the results, it is advisable to consider any possible increases in overhead which may occur during the new period. For example, the foremen may receive an increase in wages, or the renting of additional space may be contemplated, or a cost department and corps of inspectors may increase the overhead. All items which would affect the overhead percentages for future periods should be considered before current rates or percentages are established. The method of distribution should provide for a proof of the overhead percentages or rates, and the adjustment of discrepancies should be made as soon as they are discovered.

Classification of Product, Departments, and Accounts

Although the classification of the product, the names of the departments, and the general and factory ledger accounts to be opened should be determined and any difference of opinion adjusted before the new methods are put into operation, it will often be found necessary to make changes in these matters after the cost system is started. These changes should be considered as promptly as possible and adopted, if necessary, without delay.

Reports and Records

Assuming that the factory records have been given a preliminary trial and that the employees are thoroughly familiar with their nature and purpose, attention must then be given to the method of summarizing the reports and familiarizing the personnel with the procedure involved. This work should also be done, if possible, during the preliminary period. After the summaries are prepared, the posting of the information to the ledger accounts will be in order.

Trial balances should be prepared to prove the mathematical accuracy of the subsidiary stores ledgers and cost records. Statements should then be made out before any adjustments are considered, for the reason that discrepancies are often brought to light in a statement that would otherwise be unnoticed. During the first few periods, a cost system may not operate as smoothly as it will later when necessary adjustments have been made. No discouragement need be felt if these adjustments are required, because lack of proper information or the overlooking of certain details may have caused them. Of course, every effort should be made to reduce all discrepancies to a minimum, so that the reports and records may serve their true function of indicating inefficiencies in the factory operation and in the organization.

Part VI—Simplified Cost-Finding Methods

CHAPTER XXVII

ELEMENTARY COST SYSTEMS

Valuation of Closing Inventory

One of the advantages of operating a perpetual inventory, as previously pointed out, is that it enables a balance sheet with a supporting manufacturing profit and loss statement or a trading and profit and loss statement to be prepared at the end of each cost period without the necessity of making a count and valuation of the items of stock and merchandise on hand. In many mercantile houses and in some manufacturing businesses a perpetual inventory is not maintained either because of the multiplicity of the lines handled or because of the small intrinsic value of the product. Under these conditions, if the product or lines sold are homogeneous and the average gross profit made on all lines can be determined with fair accuracy, the value of the closing inventory may be ascertained in the following simple way: Determine first the cost of sales for the month by deducting from the sales the percentage of gross profit. Thus, if sales for the period are $1,000 and the gross profit on them is 50%, the cost of sales figure is $500. Then from the total charges for the month deduct the cost of sales. The remainder represents the value of the closing inventory.

It may be noted that the cost of sales can only be accurately determined in this way when material and labor costs are either more or less fixed or when fluctuations in these items are reflected in the selling price. In other words, any increase or decrease in the items of cost must show a corresponding increase or decrease in the selling prices. Where this is true

and the industry earns a fixed percentage of gross profit, financial statements may be prepared at the end of any period.

Method of Preparing Statements

The method of preparing statements may be concisely illustrated by using the trial balance presented in Chapter XIX, which at the end of the first period was as follows:

THE BROWN MANUFACTURING COMPANY

GENERAL LEDGER TRIAL BALANCE

January 31, 1918

1	Cash	$ 39,700.00	
2	Accounts Receivable	159,000.00	
3	Notes Receivable	15,000.00	
4	Merchandise Inventory (balance, January 1)	226,700.00	
5	Machinery and Fixtures	35,000.00	
6	Notes Payable		$ 15,000.00
7	Accounts Payable		64,000.00
8	Pay-Roll		.....
9	Capital Stock		350,000.00
10	Surplus		54,700.00
11	Sales		85,000.00
12	Merchandise Purchases	59,000.00	
13	Productive Labor	18,000.00	
14	Factory Indirect Expense	7,000.00	
15	Selling Expenses	5,800.00	
16	Administrative Expenses	3,500.00	
		$568,700.00	$568,700.00

If an examination of the financial statements covering several previous periods shows that the gross profit averages 30% of the sales, it is obvious that 70% of the sales constitutes their manufacturing cost. In the above example sales amount to $85,000. Thirty per cent of this amount represents the gross profit of $25,500, and 70%, or $59,500, represents the cost of the sales. From these facts, a statement may be prepared showing the value of the closing merchandise inventory.

Schedule Showing Merchandise Inventory
January 31, 1918

Merchandise Inventory, January 1, 1918		$226,700.00
Charges for January, 1918:		
Merchandise Purchases	$59,000.00	
Productive Labor	18,000.00	
Factory Indirect Expenses	7,000.00	
Total Charges for the Month		84,000.00
Total		$310,700.00
Credits for January, 1918:		
Cost of Sales (70% of $85,000)		59,500.00
Merchandise Inventory, January 31, 1918		$251,200.00

With the cost of sales and the value of the closing inventory determined, financial statements may then be prepared.

The Brown Manufacturing Company
Estimated Statement of Assets and Liabilities
January 31, 1918

Assets		*Liabilities*	
Cash	$ 39,700.00	Notes Payable	$ 15,000.00
Accounts Receivable	159,000.00	Accounts Payable	64,000.00
Notes Receivable	15,000.00	Total Liabilities	$ 79,000.00
Merchandise Inventory (estimated)	251,200.00	Capital Stock	350,000.00
Machinery and Fixtures	35,000.00	Surplus	54,700.00
		Estimated Net Profit	16,200.00
Total Assets	$499,900.00	Total Liabilities and Capital	$499,900.00

The Brown Manufacturing Company
Estimated Manufacturing and Profit and Loss Statement
For the Month of January, 1918

Sales		$85,000.00
Cost of Sales:		
Merchandise Inventory, January 1, 1918	$226,700.00	
Merchandise Purchases	59,000.00	

Productive Labor	18,000.00	
Factory Indirect Expenses	7,000.00	
Total	$310,700.00	
Less Merchandise Inventory, January 31, 1918	251,200.00	
Total Cost of Sales (70%)		59,500.00
Gross Profit (30%)		$25,500.00
Expenses:		
Selling Expenses	$ 5,800.00	
Administrative Expenses	3,500.00	
Total Expenses		9,300.00
Net Profit		$16,200.00

The above statement is drawn up in its simplest possible form, it being understood that a more detailed analysis of the merchandise purchases, productive labor, factory indirect expenses, selling expenses, and administrative expenses may be made, or separate supporting schedules may give the detailed items composing each of these totals.

In preparing the statement, the items are taken directly from the trial balance and general ledger accounts. Given the average percentage of gross profit, the inventory may be obtained from the calculations made on the statement. After the estimated valuation of the merchandise inventory is arrived at under this method, a comparison of the estimated amount with that of an actual physical inventory would prove the accuracy of the method and the correctness of the percentage figure used.

Advantages of Percentage Method

The advantage of this plan lies in its simplicity. It eliminates the necessity of costing each separate invoice to a customer and also of keeping account of the cost of merchandise returns. This part of cost work is burdensome, as it involves

a considerable amount of detailed calculations and summarizing. A further argument in favor of the adoption of this simple method is that, if the inventory and cost of sales figures as shown by estimated statements prove to be unreliable, this is one of the best reasons for the adoption of more complete cost-finding methods. A cost system, in whole or in part, is often installed if statements based on estimates can be shown to be an ineffective check upon the operations of the business.

Percentage Method Applied to Several Product Classifications

Where different kinds of articles are sold, separate departments may be established for each product classification. The percentage of gross profit and of cost of sales may then be ascertained for each department and the statement developed to show the inventory valuation of each kind of article or product. When this is done, records are required to show: (1) the transfer of any merchandise and labor items from one department to another, and (2) the material and supplies requisitioned, to be charged to departmental accounts.

Where several departments are established, it is well to provide a complete chart of accounts and analysis records so that the charges and credits affecting each department account may be correctly ascertained, for which purpose some of the cost summarizing records described in Chapters XVI, XVII, and XVIII may be used to advantage.

Unit Method of Figuring Costs

Where only one or a few kinds of product are handled, such as in the case of an ice manufacturing plant, or a dealer in coal and firewood, costs can be readily obtained if stock records are kept showing the quantities or units of merchandise on hand at the beginning of the period, the quantities purchased or manufactured, and the quantities sold. Assuming that the ledger accounts show the amount of materials and

supplies used, wages paid for productive labor, and the indirect expenses, the average cost per ton, pound, barrel, cord, or any other unit may be obtained by dividing the number of units produced or purchased during the period into the total costs for the same period. When this plan is used, it is unnecessary to change the method of keeping the accounts in the general ledger. The ordinary financial accounts plus data as to the above-mentioned quantities or units are all that is required to obtain the cost of sales and thus figure the value of the closing inventory and prepare financial statements.

The advantages of this plan lie in its simplicity, as the cost of sales is ascertained without the large amount of detailed work involved in costing invoices separately. Moreover, the plan often brings to light discrepancies, thus indirectly proving the value of more detailed methods when more than one line of product is handled.

Applicability of Unit Method

The unit method is applicable to both mercantile and manufacturing concerns. It may be used by real estate concerns when a large tract of property is purchased, developed, and divided into lots for sale. A record is kept of the number of lots obtained from the tract, and this number divided into the cost of development to date gives the cost of sales on each lot sold. Selling prices on various lots may be established from the lot record in connection with the development costs of the property. Then each lot sold may be traced both as to cost and selling price, and a profit and loss statement, using this information as a basis, may be prepared.

The system may also be used in the retail coal business by keeping stock records of the tons or other units of each kind of coal purchased and sold and by determining the average purchase price of each unit as a basis for calculating the cost of sales. Provision may need to be made for the trans-

fers of coal from one location to another and also for any loss in weight. The latter should be provided for by means of a percentage based on past experience.

In wholesale and jobbing industries, where the product sold is more or less uniform in character and where ample stock records may be provided for keeping track of the quantities on hand, purchased, and sold, these records would form the basis for obtaining the cost of sales if the average purchase price were first determined. In small businesses the ledger accounts may be ruled to show the quantities of merchandise purchased, produced, and sold. Where this is done, it is not necessary to keep a subsidiary record of stock.

Thus, the unit method of figuring costs is widely applicable. The accuracy of the statements prepared in this way will depend upon the correctness of the figures as to quantities, and those as to the average cost of sales. Where different kinds of product are handled and the cost of sales cannot be averaged, sales must be departmentalized and provision made for charging the material, labor, and indirect expenses to the various departments. Where departments are established, the accounts should be classified so that the charges and credits in each case may be accurately made.

Proof of Records

Where the preparation of financial statements is based on the number of units sold, it is necessary to prove the quantities entered upon the stock records or upon such records as are used to obtain the cost of sales. These figures should agree at the end of each period with the quantity reported sold as shown by the sales record. The quantity of merchandise returned must also be deducted from the quantity shipped before the cost of sales can be ascertained.

The value of the periodical statements will depend, to a large extent, upon the accuracy of the quantities obtained from

the detailed records. Proof of this portion of the work can only be made at such times as an actual physical inventory is taken. Where the business is well departmentalized and complete stock records are kept, it is often possible to make tests of different items composing the merchandise inventory at different times during the year. When these tests are made, any differences should be adjusted before the financial statements are prepared at the end of the period.

CHAPTER XXVIII

ESTIMATING COST SYSTEMS

Special Features of Estimating Method

An estimating cost system is one in which the cost of production is checked and controlled by means of estimates as to what the actual expenditures on certain articles or groups of products are expected to be. The predetermined estimates are usually based on previous results when the figures are available. But if the article or group of articles to be manufactured consists of a new line, the estimates must be based on the opinion of the designer of the product or the factory superintendent, foreman, or other experienced employee.

When costs are found and controlled by the order or process method of cost-finding, material, labor, and overhead figures are compiled, as the work progresses, on separate sets of records for every job, order, or process. When costs are controlled by means of estimates, the figures are compiled for articles or groups of different articles, the number of the records which are necessary depending upon the analysis of the cost elements and the number of accounts established as a means for proving the estimates. The estimated costs are incorporated in the financial accounts through a simple system of records, thereby establishing an accounting proof or check on the accuracy of the predetermined figures on which the selling prices are based. If the profit or loss on certain articles or lines at the end of the year is not satisfactory, the estimates are revised and the selling prices adjusted accordingly. As will be more clearly seen later, the purpose of the estimating method is to insure an adequate profit on the merchandise sold and to prove the costs in detail.

The advantages of controlling costs by estimates are twofold: First the clerical work is much less than that which is required to operate a complete job order cost system or process cost system, as the detailed records of material, labor, and overhead covering hundreds or even thousands of orders are compressed into a comparatively small number of records. Secondly, discrepancies between the predetermined and actual figures indicate where the estimates were at fault in the first instance and thus indicate in what direction more detailed methods of cost-finding may advantageously be installed.

Method of Operating System

In the operation of all estimating cost systems the factory receives credit for the cost of the articles produced, *which articles are priced at their estimated figures.* The factory is charged with the material, labor, and overhead expense incidental to the production of the articles. Where the product manufactured is of one kind and the styles, sizes, or designs are few in number, it may be practicable to credit the factory with the total production cost. But if the estimated total cost credited to the factory fails to agree—when a proof of total cost is made—with the actual total cost debited, the credit, which the factory receives for work done, may be divided into its elements of material, labor, and overhead and the estimated figures predetermined in the same way, i.e., as to the elements of cost. As the factory is charged with the elements of material, labor, and overhead cost from distinctive records, the proof of each of the elements of cost may be separately made.

In more complex industries where various kinds of product are manufactured, analysis records may be kept for showing the material, labor, and overhead costs applicable to each lot of product or each group of articles. When the factory is credited with the estimated cost of the work done, these credits

should also be analyzed into the lots or groups into which the factory production is divided.

Summary of Procedure

The various steps in the operation of an estimated cost system may be summarized as follows:

1. Estimated costs are predetermined for every article manufactured and sold. The figures may show the total cost only or the details of material, labor, and overhead.
2. The accounts showing the factory operations either as to the total cost of the lot or as to its elements are charged with the beginning inventory priced at the estimated figures and the actual material, labor, and overhead expenses incurred during the period.
3. The accounts showing the factory operations are credited with the total cost of the articles produced, priced at their estimated figures. (The balance of the accounts showing factory operations represents the value of the closing inventory.)
4. A physical inventory is taken at the end of the period and is priced at the estimated figures.
5. A comparison is made between the book inventory as shown by the account balances with the total amount of the inventory based upon an actual physical stock-taking. Any discrepancies between the two sets of figures indicate the extent of errors made in the predetermined estimates.

Development of System

There are several methods or, more accurately, stages of development in cost-finding by means of predetermined estimates, ranging in scope as follows:

1. Verification of estimated costs in total amount.
2. Verification of the material, labor, and overhead costs in total.
3. Verification of estimated costs of the different products manufactured, provision being made for proving the estimated cost of each product separately.
4. Verification of estimated costs in the different operating departments of the plant, the estimated cost in each being proved separately.

It is the intention in this chapter to develop the subject from a simple method of proving the estimated costs in total, to a more elaborate system whereby details are proven. It should be clearly understood that the proof of estimated costs can only be made when a physical inventory is taken, and that the inventory must be priced at the estimated costs.

Verification of Total Costs—First Method

Special Records Required

Where the estimates of the articles manufactured are proved only as to their total cost, the following records are required in addition to the regular financial records:

1. A schedule showing the total estimated cost of each article.
2. A record showing the total estimated cost of the articles produced and sold.

The schedule of estimated costs (Form 99) is a columnar-ruled sheet on which are listed the article or style number, grade or kind, and total estimated cost of each article. The information as to the estimated cost of sales is entered upon the sheet illustrated in Form 100, on which the details are summarized so that the total cost of all sales can be ascertained at the end of the month.

SCHEDULE OF ESTIMATED COSTS

For.....19.....

Article No. or Style No.	Grade or Kind	Total Estimated Cost		✓
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

Form 99. Schedule of Total Estimated Costs. (Size, 8 x 11.)

ESTIMATED COST OF SALES

No.....

For.....19.....

Article No. or Style No.	Quantity Sold	Kind or Description	Estimated Unit Cost		Total Cost	
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

Form 100. Summary of Estimated Cost of Sales. (Size, 8 x 11.)

General Ledger Accounts

For the purpose of showing the difference (if any) between the estimated costs and the actual production cost figures, two ledger accounts are opened headed respectively (1) Cost of Sales account, and (2) Production Cost, or Estimated Cost account. These accounts have no connection with the rest of the ledger so far as the detail of bookkeeping is concerned. They are operated solely for the purpose of proving the estimated costs when the actual physical inventory is taken.

The Cost of Sales account is charged with the total cost of sales as obtained from the summary of cost of sales (Form 100), the offsetting credit being to Production Cost account. Thus the debit balance of the one is always in agreement with the credit balance of the other, and the figures may be eliminated from the general ledger without affecting the other transactions recorded therein.

In charging the details of the inventories and the expenditures for the period to their proper general ledger accounts, care must be exercised to keep the original classification unchanged; that is, the items charged to material, labor, or indirect expenses accounts must be the same as those taken into account when making up the schedule of estimated costs. If any change in the classification of expenditures is made after the estimated costs are established, the validity of the proof is destroyed.

Method of Verification

The sum total of the items recorded in the inventory, material, labor, and factory indirect expense accounts include all charges applicable to factory operations. Therefore, when the credit balance of the Factory Production Cost account is deducted from the total, the balance should represent the value of the book inventory, i.e., its estimated value. When a

physical inventory is taken, and priced at the figures of the schedule of estimated costs, its total amount should be in agreement with the book balance of the inventory if the total estimated costs are correct. Any difference between the two balances is due to inaccuracies in the estimates. If the difference is a large one and its cause cannot be located, it may be necessary to make the estimates in greater detail so that the origin of the discrepancy may be ascertained without much trouble.

Verification of Material, Labor, and Overhead Estimates—Second Method

Special Records Required

When a proof is required of the estimated material, labor, and overhead cost, the article cost must be separated into its elements. To do this Forms 99 and 100 are ruled to show the estimated material, labor, and overhead costs of the articles to be produced and are supplemented with a record showing the analysis of the inventory, classified in the same way. The schedule of estimated costs and the record of the cost of sales are operated in the way already described. That is, the schedule furnishes the figures for pricing the cost of sales as to the material, labor, and overhead cost of each article sold. The total material, labor, and overhead cost of the sales are then credited to the ledger accounts, which are discussed in later sections.

Analysis of Inventory

The analysis of inventory (Form 101) is used to ascertain the estimated cost value of all product in the plant, divided into material, labor, and overhead. The ruling and headings of this form are exactly the same as those on the record of cost of sales, excepting of course the main heading.

In making up the inventory the cost of any raw material in stock is entered in the material column. The cost of any articles in process is estimated as accurately as possible as to its three elements which are entered in their respective columns. Any errors in the pricing of the work in process at the beginning of the period will probably be offset by the same errors at the end of the period—unless there is a great difference in quantities between the opening and closing inventories. The finished articles in stock are also priced as to their elements of cost and entered in the same way. The totals of the analysis thus represent the material, labor, and overhead cost of the beginning inventory, which totals are used to open three corresponding accounts on the ledger.

Operation of Ledger Accounts

The Raw Material, Productive Labor, and Factory Overhead accounts already mentioned take the place of the Production Cost account used under the first method. Instead of entering the amount of the merchandise inventory in a single account on the general ledger, it is split up into its elements on the inventory analysis and from there posted to the debit of the three ledger accounts at the beginning of the period.

During the period all expenditures for direct material are charged to Raw Material account, those for productive labor to the Productive Labor account, while at the end of the period Factory Overhead account is debited with the various indirect expenses classified in detailed accounts. In making the charges care must be taken to see that their classification is the same as that on which the estimated costs are based. If, for instance, certain items of material are classed as raw material in making up the estimates, and when consumed are charged as supplies to an expense account, the estimated material will be more than the actual material cost by the amount of material charged as supplies; and the reverse holds in the

ANALYSIS OF INVENTORY

For.................................19...... No...........................

Quantity	Style No. or Article No.	Article and Description	√	Costs			
				Total	Material	Labor	Overhead

Form 101. Analysis of Inventory. (Size, 9 x 12.)

case of the estimated and actual overhead charges. Thus the value of the comparison between the predetermined and actual figures is largely destroyed.

The debit side of the three above accounts shows the estimated cost value of the inventory at the beginning of the period, plus actual current expenditures. On the credit side appears the estimated cost of the articles sold during the period. This information, as under the first method, is gathered on the summary of cost of sales; but as it is to be shown in greater detail, i.e., as to its elements, the material, labor, and overhead estimated cost of each sale is entered on the summary and the three totals are then credited to their respective accounts—the three credit postings being in agreement with the total posted to the debit of the Cost of Sales account.

Method of Verification

As the balances of the Raw Material, Productive Labor, and Overhead accounts represent the book inventory classified in the same way as the beginning inventory, it is obvious that the book inventory should be in agreement with the physical inventory if the estimates are correct. A physical inventory is taken to verify the accuracy of the latter. Any difference between the two sets of inventory figures must be due to inaccuracies in the original estimates of cost, assuming that the physical inventories taken at the beginning and end of the period are accurate. If any element of cost in the book inventory exceeds the corresponding element in the physical inventory, this indicates that the predetermined costs have been underestimated as regards that particular element. If the reverse is true, the cost must have been overestimated.

This method of proving the estimates in detail is a valuable means of disclosing wastage of time, material, or other inefficiencies. If, for example, the actual cost of material proves to be greater than the estimated cost, while it is an

established fact that the amount of material used should not have exceeded the estimated allowance, this is a clear indication that material must have either been stolen or wasted. If, on the other hand, there is some doubt as to the reliability of the estimated material cost, and the actual cost proves the estimates to have been inaccurate, it may be advisable to amplify the system by introducing material requisitions for the purpose of more closely checking the consumption of material. If the material costs are considerably underestimated, it is probable that leaks of considerable importance exist in the methods of handling and safeguarding it, or wastes may be occurring in the different processes throughout the plant.

In the same way errors in the estimates for labor may disclose differences in the classifications of workers' time, and it may be discovered that labor which is really direct has been classified as indirect; or the discrepancies may disclose that productive workers are not keeping up to the time schedules on which labor costs are estimated; or that the piece rates are vitiated by an excessive amount of spoiled or defective work. Also differences invariably appear between the estimated and actual overhead because in comparatively few cases are all expense items included in the estimated overhead.

In revising the estimates with the object of making them approximate as closely as possible to the actual cost, no method of revision will give the exact figures. If, however, the difference between the book inventory and physical inventory as regards any of the elements be divided by the number of units of product manufactured during the period, the result will be approximately the amount to be added or subtracted from the original estimated cost of that element. This rule is fairly accurate if the output of the factory is uniform and conditions as to the material, labor, overhead items, and the production in general are fairly constant. Any radical changes in methods of routine or manufacture during a period might and prob-

ably would cause wide discrepancies, unless the estimates are carefully revised in the light of the changes. But if the revision is methodically made at the end of each period, sooner or later the estimates should approximate the true costs, the accuracy, of course, largely depending upon the correctness of the predetermined figures as to the cost of each article—as established in the schedule of estimated costs in the first instance.

Verification of Costs by Several Lots or Groups—Third Method

Special Records Required

The third development in estimated costs is the division of the factory output into two or more groups or lots the costs of which are separately predetermined and proved. For obvious reasons this development in detail necessitates the use of additional records, and thus the forms described under the preceding plan are supplemented by three more records—five in all being employed—which may be summarized as follows:

1. Schedules of costs, showing the article costs in each of the groups or lots of articles manufactured (Form 99, page 463).
2. Records showing the consumption of materials by groups or lots (Form 57, page 267).
3. Records analyzing the productive labor chargeable to each group or lot (Form 56, page 263).
4. A distribution sheet showing the distribution of the factory overhead over the different lots manufactured in their proper proportion (Form 59, page 273).
5. A cost of sales summary for each lot of product on which the estimated costs of each article

sold within the lot are summarized (Form 65, page 287).

While the general use of these records will be understood from the description in preceding sections and chapters, a detailed discussion of the accounts to which the figures collected on the records are posted will follow the discussion of the treatment of the elements of costs and the opening inventories.

Raw Materials Costs

As the material used in the manufacture of the various lots of articles must be separately recorded, a raw material storeroom may need to be operated—with a stores ledger to show receipts and withdrawals and requisitions to show for which purpose—i.e., for which lot of product—a particular kind of material is withdrawn from stores. If each lot of product were manufactured from a distinct kind of raw material, it would be possible to open a material account with each lot on the purchase journal or voucher register and charge the material purchases direct to the account. Provision would then have to be made for recording any transfers of material charged to one lot of product and used on another. Usually, however, much the same kinds of material would be consumed in the manufacture of all products, in which case a complete system of checking storeroom operations would then be necessary so that the consumption of material could be traced to the group of articles on which applied.

Labor Costs

Productive labor costs are classified in the same way as material costs so that the proper charges can be made to each lot of product. If certain employees work only on the production of articles within a group, it will be unnecessary to report their time daily as the whole of it may be charged to the labor cost of the group. But if some employees divide

their time between groups, a simple system of labor reports must be introduced for the purpose of charging the workers' time to the groups on which they are occupied in proportion to the labor cost in each case.

Overhead Costs

The method of distributing the factory overhead over the different groups of articles may be based on either the productive labor cost percentage or labor hours plan, as described in Chapter XI. As equitable a method as any and the one most commonly employed because of its simplicity is to base the distribution on the percentage which labor cost bears to overhead. When pricing the articles within a group on the schedule of estimated costs and the analysis of cost of sales, the estimated overhead chargeable to each article would then be based upon a percentage of the estimated labor cost. Thus, any difference between the detailed estimated charges (for overhead on items sold within a group) and the total actual charge (to each group or lot) is revealed when the book inventory, as will be explained presently, is compared with the actual inventory.

Opening Inventory Analysis

The merchandise inventory at the beginning of the period should be analyzed so as to show:

1. The value of the total raw material in the storeroom.
2. The value of the work in process analyzed by groups so that the charges may be made to the group accounts kept with each lot of product.
3. The value of the finished stock analyzed in the same way as the work in process.

The analysis of the inventory in the way described furnishes the opening inventory totals which are the first entries to the ledger accounts.

Operation of Ledger Accounts

The accounts opened on the ledger, under this method, for the purpose of comparing the estimated with the actual figures are:

1. Raw Material account.
2. A department account for each group of products. (If the factory output is classified into twelve groups, twelve different department accounts would be required.)
3. A cost of sales account for each group.
4. A sales account for each group.

The total cost of all raw material, as shown by the merchandise inventory at the beginning of the period, is debited to the Raw Material account; and the total cost of each of the various groups of work in process and finished stock items, as classified on the inventory, is debited to its department account.

If a storeroom is operated and material is requisitioned, all purchases of material should be charged to the Raw Material account. All expenditures for productive labor during the period should be charged to a Productive Labor account. The expenditures for the different items composing the factory overhead may be charged to one Factory Overhead account, or to each detailed expense account. If the charges are posted to detailed accounts, provision must be made for accumulating the total and transferring it to the Factory Overhead account at the end of each period.

The Raw Material account is credited with the total material taken from stock, as shown on a summary of material requisitions (Form 57, page 267)—the offsetting debit consisting of the charges posted to the department accounts kept with each group of product. The Productive Labor account is credited with the total amount of productive labor applicable to the different departments as shown by the pay-roll analysis

(Form 56, page 263)—offsetting debits being posted to the various department group accounts. Provision having been made for the distribution, Factory Overhead account is credited with the total amount of overhead—the offsetting debits being to each of the department accounts.

Thus the department accounts kept with each group of products are debited with the beginning inventory and the current expenditures. They are credited with the cost of all sales of items within the group—which credit entry is compiled on the summary of cost of sales (Form 65, page 287) showing the total cost of the various sales in each group. Any merchandise returned by customers should be calculated at its cost values and deducted from the cost of sales totals. Offsetting debit entries to the department credit entries are made to separate cost of sales accounts for each group of product sold. Provision for crediting the sales of each group to a separate account is made so that the gross profit or loss upon each of the department groups may be ascertained and a comprehensive profit and loss statement thus prepared.

Method of Verification

As under the preceding methods, the proving of the results in this case also depends upon the taking of a closing physical inventory which must be analyzed and priced in exactly the same way as the beginning inventory. A comparison of the book figures with the amount shown by the actual inventory furnishes the basis for judging whether or not the estimated costs have been accurately predetermined.

This method of proving the total cost of each item within separate groups may be developed or extended to cover a separate proof of the elements of cost in each case. To do this would entail the division of each department account into a material, labor, and overhead account with each group.

The merchandise inventories at the beginning and end of the period would also have to be analyzed as to the details of the material, labor, and overhead costs of each article by groups. In this way it would be possible to ascertain not only which group of articles was inaccurately estimated as to total cost but also to which element of cost the inaccuracies were due.

Verification of Costs by Operating Departments—Fourth Method

Special Forms Required

The methods of estimating costs so far described are suited to manufacturing conditions where the operations or processes of manufacture are comparatively simple or few in number. When the product undergoes several processes or numerous operations and in consequence it is desirable to control the costs of different operating departments by comparing the estimated figures with the actual cost, the estimating system may be further developed by predetermining the cost of each process or each group of operations and controlling production by checking up promise with performance in any desired detail. To do this, similar operations are grouped together and productive departments or production centers are formed around which to prove the items of cost. The special forms needed for compiling department cost are:

1. Records of the estimated costs analyzed by operations or departments. These records give the style number, grade, and description of the article and provide money columns for compiling the cost of each department as well as the total cost. (Form 99, page 463.)
2. An analysis of the inventory, showing the value of the raw material stock and the departmental costs of work in process for each department separately and also the value of the finished stock.

3. An analysis of purchases chargeable to the operating departments if material purchases are not chargeable to stores. (Form 50, page 246.)
4. A summary of material requisitions supported by detailed material requisitions, for the purpose of ascertaining the total material cost to be charged to departments. (Form 57, page 267.)
5. An analysis of the pay-roll, for the purpose of summarizing the productive and non-productive labor cost chargeable to each department. (This record is prepared from the detailed labor reports of employees and proved with the pay-roll record. (Form 56, page 263.)
6. An overhead distribution sheet, on which the items of factory overhead are compiled and distributed so that the totals chargeable to operating departments may be obtained. (Form 59, page 273.)
7. A production summary, for the purpose of ascertaining the credits for finished goods to be posted to the operating departments. (This summary is prepared from the detailed production reports of factory employees. (Form 60, page 274.)
8. A cost of sales summary, showing the total cost of the articles sold and shipped and the cost of any merchandise returned by customers. (Form 65, page 287.)

Ledger Accounts Opened

The accounts opened for the purpose of proving the estimated department costs are:

1. One Raw Material account
2. Separate Work in Process accounts
3. One Finished Stock account
4. One Cost of Sales account

Charges for Expenditures

The Raw Material, Work in Process, and Finished Stock accounts are charged with the total value of the inventory items to which each relates, as shown by the beginning inventory. The merchandise purchases may be charged to Raw Material account if taken into the storeroom, but if some material goes direct to an operating department, provision may be made on the purchase journal or voucher record for charging the merchandise to the department which receives it.

The department work in process accounts are charged with:

1. The material used in each operating department as shown on either the purchase record when charged direct, or the summary of material requisitions (Form 57, page 267), prepared from the detailed material requisitions. The total of these charges is posted to the credit of the Raw Material account directly from the summary. Any transfers of material from one department to another should be recorded on a separate summary so that postings may be made to the debit or credit of the department accounts affected.

2. The productive labor cost applicable to each operating department at the time the wages are paid; or provision may be made for summarizing wages in a Productive Labor account, which is credited with the detailed charges debited to departmental work in process accounts. The analysis of the productive labor charges is made upon the pay-roll analysis (Form 56, page 263) which, as already stated, should agree with the pay-roll record.

3. The factory overhead, the charge in each case being derived from the expense analysis sheet (Form 59) referred to, on which the various items of factory expense are distributed. Any of the methods of expense distribution outlined in Chapter XI may be employed for the purpose of allocating the different items to departments.

Thus, the operating department accounts which, as explained later, are used as a basis for establishing the proof according to this plan are charged with:

1. The cost of the items in process at the date of the beginning inventory.
2. The charges of material, labor, and overhead affecting each operating department.

Crediting Production

As the manufacture of the product is completed, detailed reports are received by the office from the factory showing the disposition of the finished goods and, from this information, a production summary (Form 60, page 274) is prepared to ascertain the cost to be credited to the department accounts. The different kinds and quantities of articles produced are priced at their estimated cost as shown on the schedule of estimated costs. The totals to be credited to the department work-in-process accounts represent the estimated cost of each department's operations upon its actual production. After the credit entries are made, the balance of the accounts should represent the cost of any work in process at the end of the period. The total amount of the department credits is debited to the Finished Stock account if all items are stored as finished stock.

Recording Cost of Sales

The Finished Stock account, as already stated, is charged with the cost of any finished stock on hand at the beginning of the period and with the cost of the articles produced during the period as shown by the summary (Form 60). As invoices are made out, provision must be made for recording the cost of the shipments (at their estimated price, be it noted) and to this end the estimated or predetermined costs may be entered upon either a copy of the invoice or the sales record (Form 62). The quantities of the different articles shipped may be

summarized at the end of the period to obtain the total cost of sales, from which should be deducted the cost of any returns before the postings are made to the ledger accounts. The total cost of the net sales (sales, less returns) is posted to the credit of the Finished Stock account if all the merchandise shipped is finished stock, the offsetting debit being to the Cost of Sales account. The balance of the Finished Stock account represents the value of the book inventory of finished stock on hand.

Method of Verification

The predetermined costs are verified with the actual production figures by taking a physical inventory of the items of raw material, work in process, and finished goods, pricing them at the same values as in the opening inventory and comparing the results with the book inventories. The advantage of this plan is not only that a test may be made of each of the classifications of the inventory separately, but that the cost of production may also be analyzed in any desired detail in the first instance and the results or actual figures compared with those first estimated and with the figures of previous periods. Discrepancies in the estimated cost will as a rule be discovered as the balances of the work in process accounts are compared with the actual quantity of the work in process on hand inventoried at its estimated cost.

The control of costs by means of estimates of the departmental cost of the product, as here outlined, is particularly applicable to the manufacture of a complicated article in large quantity. While the system may be expanded to cover the manufacture of several kinds of product, it will be readily understood that such a development would necessitate a corresponding increase in the number of accounts and records—so much so that the amount of detail would be almost as much as that involved in the operation of a job order system.

It should be noted that the system may also be developed

and its accuracy increased by the use of controlling accounts for different kinds of raw material and (if a variety of products is manufactured) for different kinds of finished stock.

Adjusting Differences in Inventory

In the operation of every estimating cost system the most careful attention should be given to the make-up of the estimates in the first instance. The figures which appear on the schedule of estimated costs are those on which the pricing of the inventories is based. They constitute the cost sheets of the articles priced thereon, in that they state the article cost which is used for making the selling prices. Any errors in the estimated figures necessarily affect the inventory valuations and throw the whole system of proof out of gear. When discrepancies appear between the values of the book and the physical inventories, it is important to adjust the estimated costs and revalue the inventories at the close of the period. As regards the discrepancies in the accounts of the current period, if the value of the physical inventory is found to be less than that of the book inventory, the costs have been understated and the difference constitutes a loss; as such it is transferred to profit and loss. If the physical inventory proves to be greater than the book inventory, the costs have been overestimated and the difference constitutes a profit which may be credited to either profit and loss or cost of sales. However, it should be clearly understood that when discrepancies show that the estimated costs have been incorrectly figured, the differences should not be charged to Profit and Loss account before considering the effect on the closing inventories. If the estimated costs are incorrect, the inventory values based on them must also be incorrect. Therefore, any adjustments also affect the closing inventories, the value of which should be revised.

CHAPTER XXIX

UNIFORM COST METHODS

The Advantages of Standard Methods

The advantages of standardization when applied to machinery and manufacturing operations as a means of promoting efficiency of production are, today, well recognized. The same principle can with equal advantage be applied to cost methods. The establishment of uniform cost methods has been advocated, through manufacturing conventions, for the last fifteen years and in some trades uniform methods have been widely adopted.

It would be well to correct at the outset a misunderstanding of the term "uniform cost systems." Such a definition implies in the minds of many that the system adopted by a particular trade or industry is uniform in all its details and ramifications. Such uniformity would be wholly impracticable. A more exact term to use would be "uniform methods of cost-finding," the definition here implying that, while the methods are uniform, the records, forms, etc., necessarily vary to suit the needs of the individual case.

There are many pertinent reasons for the adoption of uniform cost-finding methods, especially in trades where competition is keenly felt. While it is not possible under existing laws to establish uniform selling prices, there is no law to prevent uniform cost methods. The advantage of basing selling prices on such uniform methods is that each manufacturer in the same industry then knows that the price he asks for his product is a fair selling price. If he cannot compete with other concerns which figure costs and selling prices in the same way, he is forced to conclude that his

costs are too high. In that case it is up to him to analyze closely his methods of manufacturing—whether or not he is buying his materials at the right prices or using the most up-to-date machinery and methods; whether his operating departments are properly balanced and his production is commensurate with his expenditures for labor and overhead; and so on.

Many manufacturers are unable to figure how competing concerns can sell products similar to their own at a much lower price. There are, of course, certain articles called "leaders," which are sold at cost or less than cost for the purpose of influencing trade. Ignoring these articles, the only explanation of the fact that like articles are frequently sold at different prices by competing manufacturers is either that their methods of figuring costs or profits differ, or that the actual costs are much higher in one case than in another.

Examples of Haphazard Methods

Some years ago the secretary of a certain trade association sent out a list of unclassified overhead items to members of the trade, with a request to classify them under the heads of factory overhead, selling, and administrative expenses. The replies were to be designated by numbers and presented at a forthcoming convention, without divulging the names of the concerns furnishing the information.

Out of fifty replies received no two classifications of the various items of expense were in agreement. Furthermore, some omitted administrative expenses altogether from the cost, some added interest on investments, others did not, and several failed to include the salaries of the executives as part of the administrative expenses. This test clearly showed the need of uniformity in methods of cost-finding. Toward this goal much progress has been made in recent years—as is proved by the gradual abandonment of the old-style method of

cost figuring of twenty years ago. This last method is illustrated by the following experience.

About twenty years ago a New York capitalist was anxious to find out how costs were figured in a New England factory. The general manager of the concern, when requested to explain his method, exhibited the following schedule:

STYLE, 100

Material Cost	$2.00	per dozen
Labor Cost	3.00	" "
Total	$5.00	" "
Add 50%	2.50	" "
Selling Price	$7.50	" "

When asked, "Where are your overhead, selling expenses, and profits?" the reply was, "It is all included in the 50%"; and in reply to the further question, "How much of that $2.50 is overhead, how much selling expense, and how much profit?" the answer was, "I never figured that out. I only know that, by selling the article at $7.50 a dozen, I realize a profit."

Though no modern manufacturer works today in such darkness, it is a common practice to estimate material, labor, and overhead costs and add an arbitrary percentage for selling and administrative expenses and profit. A selling price is thus determined with no knowledge of how near any of these estimates are to the actual facts.

Method of Standardizing Costs

Every manufacturer should use his influence to bring about the adoption of uniform methods in his own trade. Such methods should be based on the fundamental principles of cost accounting, and should show the correct distribution of the elements of cost. Standardization is applicable to all systems alike—estimated, order, or process costs.

In the standardization of methods the first steps are to establish a uniform classification of the products of the trade and, so far as is practicable, a uniform classification of the operating departments. Different operating conditions may sometimes interfere with uniformity as between productive and non-productive departments.

Attention should next be directed to the classification of the direct material and direct labor items. Opinions sometimes differ in the same trade as to which of the various classes of raw material are to be treated as part of the prime cost and which as an expense. Under some conditions, some material items may have to be handled as an indirect charge for the reason that it may be impracticable to treat them in any other way.

The standardization of the productive labor costs should cover all processes and operations. Investigation may show that certain kinds of work are treated as productive labor cost in one plant, whereas in another the same costs are applied to the product in an indirect manner.

The treatment of the factory overhead, selling expenses, and administrative expenses necessarily varies in different factories in the same line of business. The size of the organization, location of the plant, method of marking the merchandise, method of obtaining material, the labor situation, and many other factors may lead to marked difference in the way overhead is handled. However, if this element of cost is to be as uniform as possible throughout the trade, the items composing it should be classified, where practicable, in the same way.

The methods of distributing overhead to the various departments of the plant, and finally to the product, oftentimes differ greatly as between manufacturers in the same line of business. As the methods of distribution are in all cases arbitrary and some of the figures are estimated, uniform methods

of treating overhead are difficult to adopt throughout a particular trade. Nevertheless, the nearer a standard ideal is approached, the fewer will be the variations in costs.

Details to be Considered

After the elements of cost have been broadly considered and disposed of, further details in connection with each should be taken up. One thing which often varies in different plants in the same industry is the method of handling the raw material—putting it into operation and accounting for it while in process. These are details which can usually be standardized without much difficulty. The items of scrap, waste, and spoiled material should also receive consideration.

The standardization of the productive labor cost is sometimes complicated by the use of automatic machinery. Where this kind of equipment is employed, large differences in cost calculations as between plants in the same industry are often revealed. Where specialized machinery has been devised within a plant for its particular requirements, information as to the cost of operating such machinery is usually extremely confidential in character. Therefore, under these circumstances it is often impracticable to compare the labor costs of different plants with a view to the adoption of uniform methods of calculation. The study of the productive labor items should include the method of paying wages and accommodations afforded the various factory employees.

Where the manufactured articles undergo different processes, it is impossible to compare the costs unless they are analyzed departmentally. In making the analysis, all the items of overhead which apply directly to departments should be so charged, leaving only a residue of general operating expenses to be prorated equitably over all departments.

It should be borne in mind that it is not essential for the uniform cost methods adopted by a given trade to be

strictly scientific and accurate. Their main object and the chief advantage of their use is that all costs may be figured in precisely the same way. Any mistakes made in determining the selling price would then be the same throughout that particular trade, in which event unfair and ignorant competition would cease despite the faults or deficiencies in the methods of cost-finding adopted.

While the value of applying uniform cost accounting methods to every trade cannot be questioned, it must be acknowledged that it is always a difficult matter to bring the manufacturers of a particular line together and induce them to adopt uniform methods as a body. If, however, such methods should be contemplated by any body of manufacturers, the cost of studying conditions and devising an appropriate system should be undertaken and carried out by a committee appointed by the association, with full power to act. If this matter is left with the members of the trade individually, little progress will be made, for the reason that most manufacturers believe that it is the "other fellow" who is not correctly figuring his costs.

Part VII—Cost-Plus Contracts

CHAPTER XXX

RECOMMENDATIONS OF INTERDEPARTMENTAL COST CONFERENCE

Work of Conference

During the summer of 1917 an Interdepartmental Conference on Uniform Contracts and Cost Accounting Definitions was organized at Washington to consider and make recommendations concerning the matters named in its title. The conference, which consisted of delegates from the Departments of War, Navy, Commerce, the Federal Trade Commission, and the Council of National Defense, published a pamphlet under date of July 31, 1917, making certain recommendations in connection with contracts and costs. The author, who at that time was chief of the Division of Cost Accounting of the Department of Commerce, had the honor of being chairman of the conference from the time of its inception until the report was made.

It is not the author's intention to present any arguments for or against the usual terms of government contracts. The purpose of this chapter is to deal particularly with cost items as applied to cost-plus contracts. To understand their application, however, it is advisable for the reader to be familiar with the report of the Interdepartmental Cost Conference on Contracts, and therefore the recommendations issued by its delegates are herewith reproduced.

Recommendations—Their Object

"These recommendations are intended to suggest to contracting officers some of the broad legal and equitable points involved in war contracts, and to express the preference of the conference for a straight purchase-and-sale contract at a fixed price, since it is simpler in terms, easier to work under, and generally speaking, productive of better and quicker results. The British Government, after several years' experience, has discarded the cost-plus contract plan and adopted the straight purchase-and-sale contract in every instance possible. It is not proposed to go into the large question of policy involved in attempting to prevent demoralization of markets by excessive competition. Suffice to say, that the Government can furnish material and component parts under either a fixed-price or a cost-plus contract, and thus protect conditions by purchases in bulk. Recommendations and brief discussion follow.

Fair Terms and Fixed Prices

"It is recommended that, in every instance where fair terms can be obtained, contracts should be in the form of straight purchase-and-sale contracts at fixed prices.

"In the determination of 'fair terms' for fixed price contracts, the contractor, in so far as possible, should be required to state the cost and other factors upon which his price is based; such representations to be the subject of investigation by the contracting officer prior to the final execution of the contract, and if found to be incorrect, the price to be adjusted accordingly.

"What constitutes 'fair terms' can be arrived at only by consideration of many factors, such as:

1. The quality and quantity of the articles purchased.
2. Whether or not the plant is adaptable to business other than war business.

3. The duration of the job and the length of time the contractor's plant and capital will be tied up. Also the amount of capital tied up in comparison with the particular output contracted for.
4. The possibility of fluctuations in material and labor costs with attendant risk to the contractor.
5. Loss in commercial business by taking Government work, which must be given precedence; disarrangement in plant organization and labor conditions.
6. Comparison with prices of other manufacturers, competitive bidding, etc.
7. The prosperity of the trade and of the particular contractor.

"In certain instances where the article is standard, ordered in bulk, deliverable promptly, a profit amounting to 10% of costs is unreasonably high. In other instances where the quality of the job is high, the quantity small, or where the job ties up the contractor's plant and capital for a long period of time, or where the material and labor risk is considerable, or for other similar reasons, such 10% profit may well be unreasonably low.

"Again, in agreeing upon 'fair terms' the following factors should be considered, any or all of which greatly aid the contractor and should tend to lower the price.

1. United States to supply material or component parts.
2. United States to readjust price in the event of fluctuations in price of material or component parts resulting in increased costs.
3. United States to readjust price in the event of labor disputes resulting in increased labor costs.
4. United States to make frequent payments to reimburse the contractor for expenditures for material, component parts, or the like.

"To skimp fair terms will inevitably tend to cause contractors to lose interest in production and disturb general business conditions. Fair terms can only be determined by consideration of these general principles as well as the special factors indicated above that may apply to the particular production contracted for.

Form of Purchase-and-Sale Contract

"It is recommended that a standard form of straight purchase-and-sale contract at a fixed price be adopted for use wherever practicable. It should contain clauses which will deal with the following subjects:

1. Method of delivery; storage of production; shipment to point designated.
2. United States to pay for raw material when delivered to contractor.
3. United States to have the right itself to supply material and component parts.
4. United States to adjust price on increased material costs above estimated costs.
5. United States to adjust price on increase in labor costs.
6. Liquidated damages.
7. War clause termination.

"Although a straight purchase-and-sale contract for a fixed price adjusted as indicated is greatly to be preferred, nevertheless in numerous instances the United States will be obliged to obtain production by paying for the entire cost of the same and in addition a fair profit to the contractor. Such cost-plus contracts may be necessary under the following conditions:

1. Where the production is novel and the contractor has had no past experience upon which to base a price;

for example, steel helmets, large caliber guns and shells for same, aeroplane motors, and the like.

2. Where the production involves difficult and complicated manufacturing effort subject to changing plans and specifications, or wide fluctuations in material costs; for example, steel and wooden ships, aeroplanes, optical glass-work, and the like.
3. Where the contractor, though deserving of confidence, lacks sufficient working capital and plant equipment to carry through the job.
4. Engineering or building jobs for which the cost-plus contract has for many years been standard.

Relations Established by Contract

"It must be borne in mind that a cost-plus contract establishes a relation of trust between the United States and the contractor, in which the contractor is legally responsible at all times to work in the interest of the United States and receive no profit beyond that definitely specified in his contract. For all excessive costs, hidden profits in the form of depreciation, overhead, discounts, and the like, the United States may refuse to pay, or, if the contractor has thereby profited, may sue and recover. Practically, however, the interests of the United States and the contractor are inevitably opposed if the profit is based upon a percentage of cost. The temptation is great to the contractor to inflate his own costs, as well as the costs of subcontractors, and the task of the United States is difficult and burdensome in checking and determining proper costs.

Fixed Profit Plan

"It is recommended that in cost-plus contracts a fixed profit of a definite sum of money per article be agreed upon instead of a percentage of cost.

"Such fixed profit can be arrived at by taking a percentage, say 10%, of the estimated cost of each article or the entire job. In instances where estimates of cost are impracticable, it becomes of paramount importance to choose a contractor in whose integrity the United States may have the fullest confidence. Where a fairly close estimate can be made of the cost of the article or job, upon the completion of the contract the actual cost can be checked against the agreed estimate and the contractor permitted to share in the saving, or be charged with part of the excess of cost, depending upon the outcome. Such an arrangement stimulates the contractor to save costs and time, because the two go together. This cost-plus adjustable fixed-profit contract unquestionably affords the Government the greatest protection in cost-plus contracts. Great care should be used in fixing the estimated price, which, if too high, may result in giving the contractor a profit entirely undeserved.

Adjustment of Fixed Profit

"It is recommended that in cost-plus contracts the fixed profit agreed on be subject to adjustment, so that the contractor may share in the saving of, or be charged with part of the excess of, actual cost over estimated cost. In some instances the contractor may agree to pay for all excess over a certain named figure of cost, and the advantage to the United States in such an arrangement is too obvious for comment.

"In the determination of costs, direct labor and direct material are easily ascertainable; it is the indirect charges to the job, overhead, and depreciation, that present difficulties. To contract to pay a proper charge for overhead and depreciation leaves the door wide open for endless discussion, and it is suggested that wherever possible the amount of these items be tentatively fixed in advance, based on definite representations of the contractor as to the amount of fixed capital assets

to be depreciated and the estimated overhead. Such amounts should always be subject to revision in case such representations prove to be incorrect. This puts it up to the contractor to make an honest representation and provides ample opportunity to check the same.

Standardized Forms and Methods

"It is of the utmost importance that standardized forms of contract as well as standardized methods of determining costs be applied to this class of contracts. Such standardization will produce clarity in the relation between the contractor and the United States and will fix precedents of construction for certain clauses and terms. Standardization will also afford great protection to the United States, not alone presently in determining points of difference but also in Court of Claims suits that may arise. It is recommended that a standard form of cost-plus contract be adopted for use wherever practicable. As conditions necessitate changes, the form of such standard contract can be changed to suit.

Summary of Recommendations

"1. It is recommended that in every instance where fair terms can be obtained, contracts should be in the form of straight purchase-and-sale contracts at fixed prices.

"2. It is recommended that a standard form of straight purchase-and-sale contract at a fixed price be adopted for use wherever practicable containing special war clauses.

"3. It is recommended that in cost-plus contracts a fixed profit of a definite sum of money per article be agreed upon instead of a percentage of cost.

"4. It is recommended that in cost-plus contracts the fixed profit agreed on be subject to adjustments, so that the contractors may share in the saving of, or be charged with part of the excess of, actual cost over estimated cost.

"5. It is recommended that a standard form of cost-plus contract be adopted for use wherever practicable."

Normal Costs versus Total Costs

As the term "normal costs" is used in many government contracts, the attention of the reader is particularly called to the definition of its meaning as frequently employed in the following pages.

Normal costs are based on an estimated cost per unit. Sometimes material is used as the basic figure and some contracts provide that the normal cost may either be reduced or raised by any change in the price of material. The intention of this proviso is that the contractor shall suffer neither loss nor gain by changes in the market price of material. Many contracts allow 10% on cost with the proviso that if upon the completion of the job the cost per unit exceeds the estimated normal cost, 20% of the amount of such excess cost shall be deducted from the amount of profit; on the other hand, if the cost falls below the estimated normal cost, the contractor shall be entitled to receive, in addition to the regular 10%, 20% upon the amount of the difference between such normal cost and the actual cost of the delivered units. In addition to this explanation, a contract usually outlines the elements that are to enter into the normal cost.

In contracts based on normal cost a clear distinction should be drawn between normal and total costs. While the normal costs would contain all the usual elements of manufacturing cost, the total costs would include not only the normal but any special charges such as those incurred by the purchase of special facilities required for the manufacture of a particular product or incurred in connection with experiments and preliminary expenses. This matter has an important bearing on the cost of any product when a change is made from a cost-plus to a fixed-price basis. While the normal costs may

and usually do remain practically the same, the total costs would be reduced considerably inasmuch as the special facilities, experimental and preliminary expenses incurred at the beginning of the contract would not be incurred a second time. In gathering cost statistics, therefore, the normal costs should always be kept separate and distinct from the total costs of the contract.

CHAPTER XXXI

COST-PLUS CONTRACTS — MATERIAL, LABOR, AND EQUIPMENT ITEMS

General Consideration of Terms of Contract

As the general principles of cost-finding and definitions of standard cost items have been covered in Chapters I, II, and III, the discussion in the following two chapters is largely confined to the distribution of cost items according to the terms of cost-plus contracts. Not all items are enumerated, for the reason that some are so technical in character or are so specifically related to a particular contract as to be of little general interest. Those that are taken up are such as illustrate what the author believes to be the correct interpretation of the terms of cost-plus contracts, whether these be fully expressed or only implied. These interpretations are not to be applied to any subcontracts of the prime contractor other than strictly cost-plus subcontracts. The terms of the latter are often based on material and labor time, i.e., on the cost of material and a set price per hour of labor time, which hourly rate includes all overhead and the profit on the subcontract.

While the classification of the items in the following chapters aims to group those of a like nature together, it will be noted that their treatment under cost-plus contracts often differs from their treatment under ordinary commercial conditions. In government cost-plus work, the costs are interpreted according to the provisions of the contract. This sometimes lists a certain number of classifications and refers in addition to the pamphlet "Definition of Costs" issued by the Chief of Ordnance, War Department, under date of June 27, 1917.

Need of Special Rulings

In all cost-plus contracts many items of cost cannot be foreseen before work begins, either by the contractor or the buyer. Therefore, a large number of special items are discussed in the following pages. These items may apply to any exceptional conditions which the terms of the contracts do not cover. For instance, in some contracts special facilities may or may not be allowed as costs; in others, interest on investment and working capital or interest on money borrowed by the contractor to carry on the cost-plus work is allowed; again, the interest may be limited to that on working capital or on money borrowed by the contractor to finance the purchase of material to be used on cost-plus work; or interest may be eliminated.

The intention here is not to make definite rules to cover all cases, but to illustrate, so far as possible, the treatment of costs under cost-plus contracts wherever the contract itself does not specifically take care of the items in question. Before proceeding with the discussion, the author wishes to state emphatically that so far as is consistent with the forms of cost-plus contracts, the distribution of costs between the contractor and the buyer or contractee has been made in precisely the same manner as it would have been made had the contractor called him in to make the distribution on straight-purchase price contracts. Also, the opinions expressed herein are not made in any official capacity, but are the personal opinions of the author.

Betterments and Equipment

Treatment of Additions and Special Facilities

Expenditures for special facilities, which usually are in the nature of a betterment, may be charged as cost when they are exclusively employed on cost-plus work, providing that the contract authorizes the charge. In all other cases they should

be charged to a Betterment account and be subject to depreciation, of which the cost-plus contracts would bear their proportionate share.

Where betterments, additions, or other special facilities are charged 100% to cost-plus contracts, the following facts should be taken into consideration:

1. Where the betterment, addition, or other facility is manufactured in the plant and not purchased from outside, and may be removed when work on the contract is completed without injury, such cost should be allowed with profit under a cost-plus contract.
2. Where the betterment or other facility is attached to a machine or a part of the building or connected with a part of the plant in such a way that its removal would practically destroy its residual value, it may be subject to reimbursement or compensation without profit.

Unless clearly stated in the contract itself, expenditures of the above character should not be treated as a part of the normal costs, but should be reimbursed and profit should be added only when the betterment is manufactured in the plant. All purchases of betterments, where provided for in the contract, should be reimbursed without profit. Some contracts do not allow profit on increased or special facilities whether purchased or manufactured in the plant.

Where the betterment is used exclusively for the benefit of the cost-plus contract and cannot be used for any other purposes in the contractor's business, either before or after the cost-plus contract is completed, it should be subject to reimbursement with profit. On the other hand, where the article can be used for other purposes, it may become either an asset of the contractor subject to depreciation, or under certain

conditions a part of the overhead; or again, a certain arbitrary percentage of its value may be charged to both the cost-plus and other contracts. It should always be clearly understood that wherever the government pays the full price of any article, it becomes United States property.

Treatment of Fixtures and Special Equipment

When special equipment is purchased for the needs of a contract, the method of charging it should be given careful consideration. For instance, the fixtures employed in staging shoring, and blocking ships may be used in the construction of several vessels. Such equipment, therefore, should not be written off to expense when purchased, which custom is frequently followed in ship yards. While it is true that its depreciation would be considerably higher than on most equipment, nevertheless it is still as necessary a part of the shipbuilding plant as the wagons, piles, planking, etc., are to a building contractor doing ordinary construction work. The opinion is here offered that all expenditures of this character should be charged to cost-plus work as depreciation.

Office Furniture and Fittings

Purchases of office furniture, filing cabinets, typewriters, addressing machines, copying machines, adding machines, and supplies, which are to be used solely in connection with work on cost-plus contracts, should not be treated as normal costs but as a cost subject to reimbursement without profit.

Rebuilding, Renovating, and Equipment Charges

Any expenditures on rebuilding, alterations, renovating, and removing machinery and equipment, which are incurred for the benefit of the plant as a whole and which cannot be considered as an asset increase, should be treated as a deferred overhead cost unless expressly provided for in the contract

as increased facilities, in which case the cost may be allocated directly to the contract on which incurred. If the expense in question is a direct overhead charge to a specific contract, it should not be charged to general overhead for distribution over all contracts covering items of the same character. Under these circumstances several accounts or classifications should be made, namely, one account chargeable directly to cost-plus contracts, another chargeable directly to other contracts, and a third to be a general overhead item. Inasmuch as certain expenses of this kind may be incurred, at times both for the benefit of the cost-plus contracts and other contracts, no share of expenditures for the adjustment of equipment, other than that directly affecting cost-plus contracts, should be charged thereto.

When changes, improvements, or additions, whether of a permanent nature or for temporary use, are to be made to machinery, plant, or equipment, the questions of how the cost is to be applied and whether the additions are to belong to the contractor or the buyer should be determined before the cost-plus work begins.

Freight or Express on Equipment

If any equipment used on the contract is provided by the contractee or buyer, all freight and express charges and the expenses of its installation are chargeable 100% as part of the overhead cost of the contract work. If, on the other hand, the contractor himself buys equipment or machinery, the freight, express, and other expenses should be charged to plant investment and not to overhead.

Setting up Machines

Any costs incurred in setting up machines are chargeable directly to the specific contract for which the machinery is installed. If a machine works on various contracts, the charge would be to overhead.

Monorail System

A conveyor might be installed strictly for the needs of cost-plus contracts. If so situated that it could be used on ordinary commercial work either before or after the completion of the contract, it would be an addition to the plant assets and subject to depreciation. Should the system be so placed that it could not be used on cost-plus work without removal to another part of the plant, then the estimated cost of this removal should be ascertained and should be charged 100% as overhead against the contract for reimbursement with profit, but not to be included as normal cost.

Installing Workmen's Washing Facilities

Items of such character as workmen's washing facilities should be charged as deferred overhead expense and treated in the same manner as betterments.

Housing of Laborers

Expenses incurred in connection with the housing of workmen (excluding the purchase of land, the construction of buildings, or other expenditures of an asset nature) may be treated as overhead, from which any income received from such assets should be deducted. The asset expenditures may be amortized if authorized by the buyer.

Repairs, Renewals, and Replacements

Method of Treatment

Repairs, renewals, and replacements sometimes require special treatment. If the buyer has supplied the contractor with machinery or has reimbursed him for its purchase or for the erection of buildings, the ownership of such property is vested in the buyer. Wherever such expenditures are made directly and only for cost-plus work, they become a direct charge;

when used for commercial work as well, the charge should be made to overhead. The cost-plus contract should bear no part whatever of the cost of the contractor's machinery if used by him for commercial work only.

Wherever replacements of machinery are made necessary by cost-plus work and a purchase is made, the contractor is entitled to reimbursement, but profit should not be added. If any laborer is employed in connection with replacements, he should be allowed a profit on the labor. If the machinery is manufactured, a profit should also be allowable on material.

Extraordinary Repairs

A distinction should be made between the ordinary upkeep of a plant, consisting of the repairs and replacements due to wear and tear, and extraordinary repairs which may be regarded at times as a betterment. Changes in equipment or the moving and rearranging of a plant are often included as ordinary repairs. Betterments such as putting in extra doors, putting on a new roof, making material changes in the construction of a building, etc., are charged at times to an ordinary repair account but should be charged as extraordinary repairs.

Where betterment items are not charged against depreciation reserve, and the value of an equipment is held intact as an asset, subject only to the regular rates of depreciation, and the betterment in question does not materially enhance the value of the equipment, such items may be chargeable as extraordinary repairs. These should constitute a deferred charge, and be written off or amortized during a period of from one to three years. The amount written off should form a part of the overhead expense, unless specially authorized and approved by the buyer and used only in the interest of his contracts. In this case, the amount would be chargeable to such contract as direct expense, providing the contractor does not in any way participate in the value of such items.

Material and Supplies Items

Material Cost

Cost-plus contracts usually specifically state that the actual cost of material only shall be charged thereto. Should the contractee or buyer, for instance, buy raw material at a bargain, he could not, under the terms of the contract, charge the contractor for a greater sum than was paid for it; and on the other hand, the contractor who bought material under the market could not charge the market price to cost-plus contracts. The actual purchase price in each case would have to be used.

Supplies

Supplies are usually regarded as an overhead expense, but more accurate costs would be obtained if they were divided into direct supplies chargeable against current contracts and indirect supplies chargeable to overhead, when the latter could not be allocated to any particular contract.

Pricing of Material and Supplies

Where material is bought at different times and at various prices and it is not practicable to use a definite purchase figure, an average price should be computed on all material put into process, whether owned by the buyer or the contractor. If the average price does not balance correctly at inventory periods with the value of the amount on hand, any discrepancy should be adjusted, when possible, by charging or crediting the contract involved; if this cannot be ascertained, the charge or credit should be made to overhead expense.

Shortages, Overs, and Obsolete Material

The payments made by the contractor for purchases should be recorded and charged to the contracts affected. To take care of any shortages and overs, it is advisable to open

an account called "Over, Short, and Damage," charging it with shortages and crediting it with overs or any claim paid for shortages. The balance of the account would be debited or credited to either overhead expense or the contract affected, as the case might require.

Obsolete stores should not be included as a cost unless they represent losses on purchases to be used on cost-plus work and made since the date of the contract.

Inventory Adjustments

When any difference between the book and the physical inventory of materials and supplies which have been used on cost-plus contracts cannot be located, such difference may either be charged or credited to overhead expense, as the case may require. This rule should apply only to normal or small differences, as any large discrepancy would necessarily have to be accounted for.

Drayage

While drayage is an ordinary item of expense, a contract for material may state the purchase price plus the cost of drayage. Therefore it would seem that the word "drayage" should be interpreted so that no misunderstanding may arise in its application to cost. The recognized commercial use of this term implies the hauling of freight or express from or to a depot, but it does not cover hauling of every description, such as the transfer of material from one part of a plant to another.

Packing and Packing Supplies

Boxes, lumber, nails, containers, strapping, and miscellaneous packing supplies as well as the packing labor incurred on cost-plus work may be included as part of the overhead, which should receive credit for any salvage.

Transfers of Inventory Items Between Factories

When for the sake of convenience raw material is transferred from one contractor to another working on cost-plus contracts, the purchase price only should be charged. For instance, it would clearly be unfair to the United States Government for Contractor A to add 10% to material transferred from Contractor B, even if A's contract allows this 10% on all material purchases used on government work. Contractor B naturally expects his 10%, and if A charges 10%, then 10% would be charged twice on the same material. Therefore the government would be penalized to the extent that it could go into the open market and buy the same material supplied to Contractor B for the price paid by Contractor A. On the other hand, when part-finished or finished components are transferred from one contractor to another, it is logical for the contractor making the shipment to add his 10% profit inasmuch as he has used his plant and facilities in their manufacture. The receiver of the parts would also add 10% profit in view of the fact that the components represent a purchase which will be used in manufacturing.

It should be noted that 10% is used as an illustration but it is not to be assumed that all cost-plus contracts are necessarily based on 10% plus.

If the United States Government purchases material and components at a given price from a foreign government with unfinished contracts in this country, the price of the materials or components may include interest or carrying charges. This, however, does not add to their value. Therefore, the contractor who takes over such materials and parts should add 10% to the purchase price only and not to carrying charges.

Spare Parts

In some cost-plus contracts a fixed profit is allowed on each unit of production. If the contract, as frequently hap-

pens, covers the manufacture of certain machines, spare parts will probably be required from time to time and the contract may not specify definitely their number or kinds. For instance, a clause in a certain contract provides a profit of $25 for each machine delivered, 90% of this amount, namely $22.50, being payable upon delivery and acceptance, the remainder upon the completion of the contract. Another clause of the same contract provides that upon the delivery of spare parts which amount to 30% of the total cost of each completed machine, $7.50 profit will be added. It is noted that this is for the same proportion as the $22.50 in the first-mentioned clause is to $25, or 90%. In other words, the same percentage is held out for final payment upon the completion of the contract for spare parts as for the completed contract for the machine.

In order to figure out the amount due the contractor on spare parts, it is necessary to consider the following:

1. Ascertain the total cost upon which a profit of $25 is given.
2. Calculate the percentage of the spare parts cost to the total cost.
3. Calculate the percentage of $25 profit to the total cost.
4. Use this last percentage to multiply the cost of the spare parts in order to obtain the amount of profit to be paid on the same, 90%—which, however, is all that would be payable until the completion of the contract.

In the above example care should be exercised to see that the accumulated profit payable on the spare parts does not at any time exceed $22.50, which represents the profit payable on the completed article; taking into consideration, however, that this will apply where the spare parts represent an equal number of completed articles or the proper proportion thereof.

Tools

Distinction Between Tools and Machines

Manufacturers have not always a clear conception of the correct classification of tools by their names, and this results in confusion when charging their cost to contract work. A machine is sometimes classed as a tool, and vice versa. A machine is always an asset when a pulley or belt is attached to it for the purpose of running it by power of some kind and without which it cannot be operated. Machinery which is not operated by a pulley or belt is a tool of some kind. Generally speaking, tools used in actual operation are classified as small tools and those used for the purpose of holding another tool in place are classified as machine tools. This applies to tools generally, excepting chucks, fixtures, gages, transmissions, etc.

All attachments, holders, etc., which are bought with a machine and form part of its first cost should be regarded as assets in connection with the machine. This classification, however, does not include special holders and attachments exclusively used for special work and which at the end of such work become useless.

Asset Tools and Perishable Tools

For cost purposes tools may be divided into two classes: namely, asset tools and perishable tools. These may be subdivided in each case into standard tools and special tools.

All asset tools—other than any special tools used on special work and chargeable under the terms of a contract directly to such special work—should be treated as an asset of the contractor, subject to depreciation. Perishable tools of a standard nature should be charged as an overhead expense, for the reason that it is impracticable to limit their use on any particular contract. Only those perishable tools which

are special and cannot be used in connection with any other contract work are chargeable to such special contracts.

Scrap Value of Tools

Care should be taken to see that a contract receives its proper proportion of the scrap value of all tools used upon it. If they are asset tools, the cost of their repairs and maintenance should be charged and their scrap value credited to overhead. In the same way, if the cost of any tools has been charged to overhead, their scrap value should also be credited thereto. If a special contract is charged with the full value of any tools, it should be credited with 100% of their scrap value.

Classification of Tools

While the general distinction between an asset and perishable tool is based on the life of the tool, it is somewhat difficult to determine whether it is an asset or of a perishable nature from its name, as the wear of a tool depends entirely upon the material from which it is made and the use to which it is put. An attempt should, however, be made to classify tools into several divisions for the purpose of determining depreciation rates. For instance, tools which are quickly worn out and which last from a few hours to not more than two months, would all be chargeable either to overhead or to a particular contract and would therefore have no depreciation rate. Tools lasting from two months to a year could be classed as asset tools and depreciated at the rate of 10% per month. Tools lasting from two to three years should be charged off at the rate of 33 1/3% per year; but all tools which are part of a machine, as stated on the preceding page, should be included in the rate of depreciation allowed on that particular machine.

The correct classification of a tool, either as an asset or

as an item of a perishable nature, is important in connection with charging its cost to a particular contract—unless the value of the tool can be ascertained at the end of the contract in question. Therefore, it is recommended that an inventory of the valuation of tools should be taken at the end of any cost-plus contract and the value of the inventory credited in its proper proportion to the contract, while the balance is held as a deferred charge against other contracts. This applies to all tools which have been charged, either in full to a government contract, or in full to the overhead in which the government contract would participate.

A classification of tools is here appended without any reference to the life of a particular tool. This list was compiled at a conference held with the leading tool manufacturers of the country for the purpose of determining from the name and nature of a tool as to whether or not it should be classed as an asset or a perishable article. While it is not intended to present this as a complete list, practically all tools may be classified in this way.

Asset Tools

Back rests for swing tools
Benches
Bench centers
Calipers
Chucks
Chucks for screw machines
Chucks for special machines
Countershafts
Cutting attachments
Depth gages
Die holders
Drilling attachments
Feed attachments
Fixtures:
- Breaching
- Edging
- Handmilling
- Milling
- Rolling
- Splining
- Stamping
- Tapping

Floating holders
Forming tool holders
Gages
Gear cutting attachments
Gear teeth
Hangers
Index centers
Indicators
Knurl holders
Micrometers
Milling attachments
Plain pulleys
Plain vises
Planer and shaper gages
Plates
Plugs

ASSET TOOLS—*Continued*

Plungers
Pointing tools
Pointing tool holders
Profiles
Prongs
Pulleys
Saw frames
Slotting attachments
Special tools and holders
Snaps

PERISHABLE TOOLS

Arbors
Box tools for screw machines
Broaches—for key way
Bushing
Cutting and special holes—similar to splining
Chisels
Circular cut-off tools
Circular form tools
Circular thread tools
Collet blanks
Counter bores
Countersinks
Cutters
Dies—threading—all sizes
Die holders
Drill tips
Drill shanks
Drills—all sizes
Edging cutters
End mills
Files—all kinds and sizes
Forming tools
Grinding wheels—all kinds and sizes
Handmilling cutters—numerous
Inscription rolls
Jigs
Milling cutters—numerous shapes, sizes, and cutting edges
Mallets
Mandrels—sometimes called arbors
Paper gages
Punches and dies
Polishing holders
Reamers—hand and machine
Reamer shanks
Roughing tools
Slot cutters
Screw drivers
Slotting saws—hackley, circular
Splining tools—similar to broaches
Stamps
Stamps—marking
Steel sockets
Taps
Threading dies
Thread gages
Turning tools—numerous shapes and cutting edges
Tweezers
Twist drills
Wire gages
Wrenches—all kinds, shapes, and sizes

Handling and Storing of Tools

All tools of whatever nature, whether manufactured or bought, should go into a storeroom where a proper record is kept of their receipt. None should be charged to any contract until requisitioned from the storeroom, and no tool should be issued to replace another until its scrap value has

THE BROWN MANUFACTURING CO.
New York, N. Y.

TOOL REPORT BY MONTHS

TOOL: BLANKING PUNCH

Received			Issued		Balance on Hand to Date	In Use		Scrapped		Re-Worked		Balance in Floor Crib Total to Date
Month	No.	Total to Date	No.	Total to Date		No.	Total to Date	No.	Total to Date	No.	Total to Date	
May, 1917...	120	120	9	9	111	0	0	0	0	0	0	9
June, 1917...	53	173	30	39	134	0	0	0	0	0	0	39
July, 1917...	175	348	162	201	147	0	0	0	0	0	0	201
Aug., 1917...	83	431	126	327	104	30	30	9	9	0	0	288
Sept., 1917...	743	1,174	141	468	706	30	60	142	151	0	0	257
Oct., 1917...	948	2,122	0	468	1,654	30	90	90	241	0	0	137
Nov., 1917...	160	2,282	120	588	1,694	30	120	59	300	0	0	168
Dec., 1917...	261	2,543	240	828	1,715	30	150	62	362	0	0	316
Jan., 1918...	0	2,543	53	881	1,662	30	180	67	429	0	0	272
Feb., 1918...	0	2,543	72	953	1,590	30	210	114	543	0	0	200
Mar., 1918...	1	2,544	601	1,554	473	30	240	245	788	0	0	526
Apr., 1918...	902	3,446	1,082	2,636	293	30	270	439	1,227	1,046	1,046	93
May, 1918...	1,134	4,580	437	3,073	990	46	316	236	1,463	0	1,046	218

Form 102. Record of Tools Issued, Used, and Scrapped

(Total issued = total in use + total scrapped + total re-worked + balance in floor crib.)

The authors are indebted to the courtesy of Capt. W. L. Mercier, of the Stores Section, Ordnance Department, U. S. A., for the reproduction of the above form.

been accounted for. When tools are chargeable to a particular contract a distinguishing mark should be stamped on them before they are taken into stores.

Accounting for Tools

A method of recording the number of tools received, issued, in use, and scrapped is shown in Form 102. On this single form all the details are given as to the number of a certain kind of tool chargeable to a particular contract.

Asset Tools Charged at Cost

All tools manufactured or bought by the contractor which are to be used exclusively on cost-plus contracts and are to be owned by the buyer should be treated as a cost against such contract.

Perishable Tools

In some plants it is the custom to add an arbitrary percentage on labor to cover the overhead on tools—which percentage in many cases is much higher than the overhead rate finally determined. The difference is often adjusted by crediting General Factory Overhead account, which automatically reduces the amount for distribution. This method is unsound in principle and should not be allowed.

All consumable tools used on cost-plus contract work are chargeable as indirect material. This includes jigs, dies, gages, and special tools needed for a particular job.

When perishable tools are charged to cost-plus work, full credit for any residual or scrap value should be given.

Old Tools Remade or Salvaged

It frequently happens that special tools made for one contract may be salvaged and used on another. For example, some tools may only need to be sharpened or cut down to

become practically as good as new. In calculating their cost 25% should be added to the material cost or the market value of the raw material from which the tool is made, to cover the scrap produced when originally manufactured. To this should be added the labor already expended, from which should be deducted the new labor cost required to salvage the tool. The overhead added should be based on the labor actually employed in the changing of the tool.

This method is a tentative one and may be used if the actual cost of the tools cannot be ascertained. Whatever method is used, the cost should not exceed the price of a new tool.

Repairs or Replacement of Tools

Wherever a cost-plus contract provides for increased facilities of the plant, all tools, including jigs, fixtures, and small tools required to operate a single machine or a series of machines, are to be considered as increased facilities. Any necessary repairs or replacements of the original equipment should be regarded as indirect expense and charged to normal cost, like all other classes of indirect material.

Identification of Tools Used

Standard tools made or purchased for special work may be used on various contracts, in which case it is a difficult matter to check up their use and see that the cost-plus contracts receive adequate scrap value. Any special or salvaged tools to be charged to specific cost-plus work should be stamped for identification. It is further recommended that all salvaged tools before going into the machine tool department to be reworked on, should pass through the tool room and a record be made of the same to prevent them from being recharged at tool cost.

Treatment When Basis of Contract is Changed

In some cases a contract may be changed from a straight-price to a cost-plus base, in which case any unconsumed tools and material belong to the contractor and could be used on the new cost-plus work. So far as the material is concerned the change presents no difficulty. Any perishable tools on hand, however, may have been partly used, in which case they should be charged to the cost-plus contract at their cost value less depreciation for use, which might run from 5% to 95%. From the author's experience it would seem that unless it is practicable to appraise each tool separately, a depreciation of 50% should be taken off their total cost before charging them to a cost-plus contract.

Overtime and Idle Time

Overtime

All productive overtime should be treated as direct labor and should not form a part of the overhead expense.

Idle Time on Operation

Time is frequently lost by productive workmen when the machinery needs to be adjusted or the operating departments are not properly balanced. That is to say, one department may not be able to supply the next department in that line of work with sufficient semi-finished material to keep it fully employed. Where idle time is due to these causes and the workmen involved cannot be used on other jobs, the cost should be charged to the particular contract on which the men are engaged, but no overhead should be added to the lost time. Of course, idle time which is charged in full to a particular contract should be confined to workmen who are engaged almost continuously thereon. The idle time of men who are only temporarily employed on the job should not be charged as a direct cost but as overhead.

Where the exact contract charge for the idle time which is allowable as cost cannot be determined definitely, it should be treated as regular overhead to be distributed over all contracts. The idle time of indirect workers or foremen employed wholly on cost-plus work would only be chargeable as a direct cost if such employees were compelled to be laid off while work on the contract was temporarily suspended, due to the fault of the buyer or to unavoidable working conditions.

Waiting Time as a Deferred Charge

Attention is here directed to the treatment of time lost while the men are waiting for the contract work to begin. In this case the charge should not constitute a direct cost to any contract, but should be deferred to be spread over all contracts at the proper time. Furthermore, no overhead should be added to this idle time, as ordinary shop overhead expense is not incurred unless the men are working. The hiring of men preparatory to beginning work on a contract is purely an organization expense, and as such constitutes a deferred charge to the contracts when work is actually in process—which amount may be spread over several months.

The hiring of men who are paid to hold themselves ready to undertake contract work promptly and expeditiously, results in a quicker turnover of capital than if, when work is waiting for them, production is delayed until they can be found. Hence, profits are increased by this precaution. For instance, when the hiring of men is a preparatory precaution for the purpose of pushing the production of munitions or other important governmental work, the forethought of the manufacturer naturally results in larger profits to him. Therefore, in such a case waiting time should be treated as a deferred charge to be distributed over the cost-plus and other contracts, and would only be entirely chargeable to cost-plus work when the expenditure was authorized by the buyer.

CHAPTER XXXII

COST-PLUS CONTRACTS—EXPENSE AND OVERHEAD ITEMS

Distribution of Overhead

Direct and Indirect Distribution

Wherever the distribution of overhead is based on the direct labor hour, a clear distinction should be made between the labor hours chargeable to an operation and those chargeable directly to a contract which may not necessarily be direct labor. In other words, direct labor should always be defined as productive labor in the sense that it is directly applied to some operation. If only one contract is being worked on in a particular department, the common practice is to charge it with 100% of the departmental labor including the indirect labor. But where overhead has to be distributed according to the productive labor method, indirect labor should never be used as a factor in the distribution, even though such labor may be chargeable in full to a single contract.

Distribution Over Periods of Less Than a Month

If the work on a cost-plus contract starts on the fifteenth day of the month, the direct labor is chargeable for only one-half of the month while the overhead expenses would cover the complete month. Under these circumstances it would be equitable to base the distribution and charges to the cost-plus contract on only one-half of overhead and one-half of the productive labor on other contracts. Other broken periods should, of course, be charged proportionately to the time spent upon the work.

Overhead on Bulk Products

The best method of distributing expenses over a product manufactured in bulk is on the basis of the number of pounds, tons, gallons, or other units of production delivered during the month on cost-plus and other contracts.

Deferred Overhead Charges

Preliminary Expenses

On many contracts considerable preliminary work often has to be done. For instance, the job may require that experiments be made, drafting work prepared, and special tools be manufactured. If expenditures for work of this character were charged to overhead at the time they were incurred, the contracts would bear a much larger proportion of the overhead than would rightfully belong to them, especially as part of these preliminary expenses would be chargeable to subsequent periods. Therefore it would seem best to defer the distribution of such expenses until a later period, especially if overhead is distributed on the productive labor plan, as labor on the contract during the first period may be inconsiderable.

Deferred Expenditures

Any general expenditures—such as would be incurred by moving benches or a row of lights—which are not chargeable to current repairs and cannot be considered as an asset increase, and which in consequence neither enter into production nor increase the salable value of the plant, would not be acceptable if charged in full to cost-plus contracts. Such expenditures are chargeable to deferred overhead and not to capital account under ordinary commercial conditions. Therefore, if they are incurred on cost-plus work, but are advantageous to the contractor before or after its completion, they should be treated as deferred overhead expenses and spread over several months.

Administrative Expenses

Method of Treatment

Under ordinary manufacturing conditions, administrative expenses are prorated over the cost of production and are not applied to the selling end of the business. Under cost-plus contracts this method would not be equitable, in view of the fact that administrative or any general management expense would apply equally as well to the purchasing and sales departments as to the manufacturing departments, and on government cost-plus contracts selling expenses are not allowed as a cost. Therefore, a fair proportion of the administrative expense should first be prorated over the manufacturing, selling, and purchasing departments. That portion charged to manufacturing and purchasing would be prorated over the cost of production, but the portion charged to selling would be included in selling expense, which is not charged to cost-plus work.

That part of the administrative expenses which applies to production may be equitably distributed over all contracts on the basis of prime cost, or on total cost. This last method is usually to be preferred when the distribution is first made between different plants owned by the contractor.

Where a concern owns dwelling houses and investments of a like character, which entail a certain amount of supervision, a portion of the administration expenses should be chargeable to the carrying on of such investments. These charges have no bearing whatever on the cost of production.

Excessive Salaries

In the distribution of administrative expenses, the question as to whether certain salaries are excessive or not often arises. While it may be impossible to state what salaries should be allowed, the matter should receive careful attention by the officials of a company in the conduct of their business

wherever a large advance appears in the salaries paid during one year over those of another, especially when cost-plus contracts are being worked on. The suggestion is here offered that the practice of increasing salaries to the point where they seriously encroach upon current profits as compared with those distributed in previous years, should be discouraged. It is reasonable to suppose that if an executive is receiving a salary of $25,000 a year and the profits earned by the business amount to 12% on the capital invested, he would not be entitled to double this amount if the effect of the increase of $25,000 were to reduce the per cent of earnings on the capital.

Salaries Paid After Termination of Employment

While salaries paid after termination of employment are sanctioned by business custom, they should not be regarded as a cost for distribution over current contracts on which the past services of employees have obviously no bearing. Payments for full time to officers or employees who are on weekly or monthly salaries, and who leave in the middle of the week or month, would be allowed as cost where it is impracticable to retain their services for the full period. Salary on a weekly or monthly basis, if by contract, must legally be paid if the employee is discharged or leaves in the intervening period.

Where the resignation of an officer or an employee who is working on a weekly or monthly salary is demanded, his full time should not be charged as cost on current contracts unless it can be shown that it was in the interest of these contracts to discontinue such services.

Bonus and Pension Payments

Bonus Payments

Any bonus which is based on profits payable to either workmen, or officers and clerks, should not be regarded as a regular item of cost.

Bonuses paid at the end of the year are seldom regarded as a salary addition but more as a reward or gift for the faithful performance of duty. They depend upon the amount of profits made by the business and contributed thereto by its employees. The practice of some firms is to set up a reserve for salaries, charging off each month a specific sum to overhead. In such a case, if the bonus is properly authorized by the firm and is an actual liability, it may be treated as a cost item when paid, but where it is contingent in any way either on profits or length of service, it should not be so treated. All bonuses of this character should be charged to profits, and only those actually paid for current work should be treated as a regular cost item.

A bonus calculated as a percentage on weekly wages is sometimes offered to those employees who hold their jobs continuously for six months or longer. If such a bonus is paid for cost-plus contracts, it should be reimbursed without profit. An item of this character is contingent on continuous service and in the opinion of the author should be classed as a special organization expense on which, however, the contractor should not receive any profit. Even if the reserve is made each week and charged to wages with an offsetting credit to a reserve account, a contract should not be charged with this item either directly or indirectly until the money has actually been paid. If the bonus is added to direct labor it becomes a direct charge; if added to indirect labor it becomes part of the overhead. Needless to say, on commercial contracts any extra percentages paid to workmen should be charged to those contracts.

Pension or Compensation Indemnities

Pensions are only chargeable in whole or in part to cost-plus work when a reserve is set up for this expense, based on the number of men working in the plant, all or part of whom are engaged on the contracts.

Pensions that are being paid to workmen, or their heirs, for services rendered prior to the commencement of cost-plus contracts should not be charged thereto. Usually pensions are based on the number of years of service—in most instances twenty years. When the pension commences, in the majority of cases, the employee ceases to work and is retired. It would, for obvious reasons, be unfair to charge any part of such expenditures to cost-plus contracts, their proper disposition being to Surplus account.

Of course, where reserves are set up, the payments of the pensions are charged thereto and do not affect the overhead expenses. When they are charged to overhead as a reserve, they form part of the general administrative expenses and are so distributed.

Insurance and Taxes

Fire Insurance

The United States Government does not usually require its own property to be insured, such property including raw material bought on the government's account, finished parts or articles owned, or any asset of the government. Therefore, when possible, fire insurance policies should not cover government-owned property and the government should not participate in the insurance premium charge on any cost-plus work. However, blanket policies may at times be taken out to cover the plant as a whole, in which case it might be difficult to apply the premium to any particular class of work passing through the plant. In such cases the insurance would be allowable as an overhead item. Should there be a fire loss under such a policy, the compensation received from the insurance companies should be prorated to the credit of cost-plus contracts, depending upon the nature of the loss. Where the premiums are charged to overhead, they should be prorated on the basis of the proportion of work in process and

stock or stores on hand. The contractor should be reimbursed for the premiums paid with profit, and the proportion of the cost chargeable to cost-plus work should be charged as normal cost.

Insurance Other Than Fire

There are many different classes of insurance, the premiums of which should be regarded as cost items—for instance, insurance covering tornados, losses due to explosions, losses on buildings and contracts, insurance covering use and occupancy, boilers, robbery, elevators, and so on. As the premiums are paid for the protection not only of capital but of production, they should be treated as part of the cost and distributed over all contracts.

Liability Insurance

Where a liability insurance company assumes all the risk, insurance premiums may be charged as cost items and the contractee or buyer should bear his proper proportion thereof. Where the contractor assumes the liability in case of an accident, the losses may be treated in various ways. The commissioners in some states fix the liability and direct in what manner the indemnity shall be paid to the employee who has met with an accident.

Payment may be made in one of two ways necessitating different methods of treatment. If, for example, the indemnity is paid in one sum it is either chargeable to the overhead expense of the plant, provided the accident happened when cost-plus work was being performed, or it may be charged directly to a specific contract, provided the injured workman was specifically engaged on that contract and not on others. In the case of indirect, or non-productive workers, the loss should be charged to overhead.

On the other hand, the indemnity may not be paid in one

sum, but may be spread over a long period—from twelve to thirty-six months—in the form of monthly payments. In cases where such current items are being paid to indemnify accidents which happened prior to work beginning on cost-plus contracts, such contracts could not be equitably charged with any part of these prior indemnities. However, in the majority of cases it may be more practical to allow all liability premiums to be charged as overhead expense disregarding when the accident in question happened. Any liability payments made after the completion of the cost-plus contracts would, of course, be borne entirely by the other contracts, assuming that the cost-plus contracts had participated in payments for accidents which happened before the work was started.

In some government contracts, a clause is introduced reimbursing the contractor in the performance of the contract for "a proper proportion of physical losses actually sustained in connection with the business, including losses by flood, storm, vandalism, theft, any acts of God, acts of war, or other casualties not compensated for by insurance or otherwise." Naturally, any loss of an exceptional character in connection with government contracts, would have to be specially treated. Ordinary losses which are of common occurrence in manufacturing plants are to be treated as previously described.

Premiums for Life Insurance

Life insurance premiums are sometimes paid as a protection for capital investment and to reimburse the firm or company for the loss of the services of some individual. Upon the death of the assured the insurance is, of course, paid to the company and not to the heirs of the assured. Such premiums can in no sense be regarded as a charge against any contract. The amount recovered from the insurance company could not be credited to contracts, many of which would have been com-

pleted long before the insurance was paid. Such insurance premiums are clearly a charge to profit and loss or surplus.

Income and War Excess Profits Taxes

All income taxes and war excess profits taxes are chargeable against surplus and should not be treated as a cost.

Government Taxes on Freight

Taxes which apply to freight on material and supplies ordered for a cost-plus government contract should not be charged as a cost. An account should be set up on the books and charged with all items of this character. At the end of each month a voucher should be prepared and when approved by the government accountant in charge, should be sent to the Internal Revenue Department in Washington in order to have the amount refunded.

Taxes on freight, supplies, and other indirect materials which do not definitely apply to any particular contract when purchased should be charged as overhead. Any portion thereof chargeable to the government in connection with cost-plus contracts should be charged in the same proportion as the overhead charges are distributed. The balance of the account, after setting up the charge to the government, is a direct charge to the contractor.

Interest, Depreciation, and Depletion

Interest as a Cost

While interest is not generally recognized as a standard item of cost because of the great difference of opinion among accountants as to the correctness of its inclusion, yet on some cost-plus contracts interest is allowed. The matter should, in all cases, be treated according to either the terms of the contract or any other specific agreement between the buyer and seller.

Interest charges may be divided into the three following divisions:

1. Interest on borrowed money actually paid.
2. Interest on plant, machinery, and equipment.
3. Interest on working capital.

Interest on Borrowed Money

Any interest paid by the contractor on borrowed money used as working capital may be treated as a part of the regular overhead expense only when the actual amount of capital borrowed and used in connection with a definite contract can be determined. Ordinarily, however, it would be difficult to allocate the exact capital required to finance any particular contract. Therefore, the charging of the whole amount to overhead to be prorated over all contracts is advocated, excepting where the interest is allowable only on the material used on cost-plus work, such as in some government contracts which include the "Definition of Costs" (see page 496) as a part of the contract.

The following quotation is taken from the pamphlet "Definition of Costs:" "Interest on investment or on bonded debt shall not be considered as an expense entering into the cost of contracts for the United States, but the contracting officer will reimburse the contractor for interest paid on money borrowed to finance the purchase of materials necessary to complete contracts for the United States. Interest cost will not be considered as a cost to the contractor upon which profit is to be calculated."

In the pamphlet already referred to, the following method is suggested for ascertaining the interest charge on money borrowed to finance purchases of material:

"1. Ascertain the amount of the loan upon which interest is actually being paid. This loan should have been negotiated at or after the date of the government contract. When the

amount of the loan is ascertained, the amount of interest payable on such loan each month should also be ascertained.

"2. Take the total amount of charges each month against all contracts, including material, labor, and overhead, and divide the amount of material charged during the current month to the government contracts by this amount, thereby ascertaining the percentage to use in connection with charging the cost-plus contracts with interest. For example, if the amount of the loan is $100,000 at 6%, the monthly charge for interest would be $500; and if the total charges against all contracts for the month amounted to $400,000, and the amount charged against the government contract for material amounted to $150,000, the material charge would therefore be 37.5% of the total charges, and the amount of interest, therefore, which would be chargeable against the cost-plus contract would be 37.5% of $500."

The word "material" here may be construed as direct or indirect material.

Interest on Working Capital

The following method is suggested for ascertaining interest on the working capital.

"The total charges for the month against cost-plus contracts are to be ascertained and 6% of this amount is to be charged as interest to the cost-plus contracts from the fifteenth day of each month—this being considered as an average for the month. Such interest is to run until the charges in question have been paid.

Inventories

"Interest on the inventories of raw material and supplies on hand is to be found as follows: "The total charges against all contracts are to be ascertained, and the percentage of the charges against cost-plus contracts to the total of all charges

is to be used as percentage to apply to the inventories as referred to, and interest at 6% on said amount is to be allowed the contractor each month. The inventories in question are to be taken at a figure which would be the average inventories arrived at by taking the beginning inventories and the ending inventories each month and dividing the same by two. The interest on the inventories is to date from the first day of each month.

"The buyer is to be allowed interest on all payments made to the contractor.

"All interest, as referred to above, should be carried in the same manner as regular interest account of an account current. In other words, this interest account at the end of each month will show the amount to be paid to the contractor by the buyer.

"It is understood that if the buyer makes the contractor any loans, interest on such loans or any interest that the contractor pays to banks or other parties is not to be charged as cost on cost-plus contracts. Interest on working capital, as outlined above, is intended to cover these or other items of interest."

Interest on Plant, Machinery, and Equipment

When the product passes through practically all departments of the plant and also in cases where interest on the capital invested in buildings, machinery, and equipment cannot be charged directly to specific contracts, it should be treated as part of the general overhead expense to be distributed over all contracts. Neither interest nor depreciation on any building, machinery, or equipment not used in connection with cost-plus work should be charged against a cost-plus contract.

As the interest charge is based on the amount of capital invested, only the depreciated values of the plant assets should be considered. In other words, if the original cost of the

building was $100,000 and its value has depreciated $10,000, either by writing off or providing a reserve, the net capital invested in that building would be $90,000 and interest should be calculated on this amount only.

Profit on interest chargeable on a plant investment which is owned by the contractor should never be allowed. The interest in such a case does not represent either a payment or an expenditure in connection with a particular contract. In other words, any interest allowed on plant assets should be a reimbursement only, without the addition of any profit such as would be added, for instance, to depreciation which is referred to below.

Depreciation and Interest on Plant Assets

On cost-plus work it sometimes happens that part of the equipment is owned by the contractor and part by the buyer. In such a case the same rates of depreciation should be calculated on the cost of both the contractor's and the buyer's equipment, and in the case of interest the calculations should be made on the depreciated value in both cases. In other words, the buyer should be credited with both depreciation and interest on the same terms or in the same manner that he is charged with these items by the contractor for the use of the latter's equipment.

An interesting method of adjusting this matter, usually to the satisfaction of all concerned, is as follows: The total valuation of the buyer's and the contractor's plant assets and the percentage of one to the other is ascertained and used as the basis for the distribution of depreciation and interest. To illustrate, if the total valuation of the plant assets in a given shop amounts to $100,000 and 40% belongs to the buyer and 60% to the contractor, these percentages would be used in connection with the percentage of direct labor employed, for determining the distribution of depreciation. No depreciation

and interest would be chargeable against the buyer until his percentage of direct labor exceeded 40%. If for instance the buyer's percentage for direct labor was 50%, then he would bear ten-sixtieths of the amount charged as depreciation on machinery and interest on plant.

While the policy of having the valuation of a plant made by an appraisal company meets with the hearty indorsement of the author, often from a cost standpoint appraisal figures may be misused if values other than cost are set up on the books. Some appraisals show the market or reproductive value in addition to the cost value less the proper rate for depreciation. To set up either a reproductive or depreciated value in the accounts is to place figures on the books which are useless in calculating depreciation and interest. While the market value of the plant is useful information if a sale is being considered, and the reproductive value is equally necessary in case of fire loss, neither of these values has any bearing on depreciation value. On the other hand, the setting up of the depreciated value on the books eliminates the cost value of the property upon which depreciation should be based. Therefore, only the cost value of an asset should be entered on the books wherever the appraisal report is used.

Depletion

In checking up costs on cost-plus contracts, consideration should be given to the factor of depletion. As already stated, the contract itself specifies that material and other items are chargeable at their cost to the contractor. Raw materials, however, such as lumber, iron ore, or coal may be extracted from land owned by the contractor and used on his contract work. Under ordinary conditions this kind of material would be charged at the cost of mining or lumbering plus a percentage of the cost of the land itself—computed so as to extinguish the purchase price when the material in or on the land was

removed. So long as the property remains in the possession of the contractor, his cost only must be considered.

The argument has been raised that, if the market price of the material contained in or on the land advances considerably, this naturally raises the value of the land to a much higher figure than was originally paid for it. Therefore the contractor should recalculate his costs of material over and above the actual amount paid for mining or lumbering, and base them on the appraised market value of the land. While this theory would be sound for the purpose of sale, it would not apply to cost-plus work. As stated before, the terms of a cost-plus contract always presuppose that the contractor is to charge all elements of cost at their actual cost plus a fair percentage of profit.

Method of Figuring Depreciation

The figuring of depreciation is a simple matter when the rates have once been decided upon, after which the distribution of the charges may be based on the productive labor method or any other suitable plan of overhead distribution. Of course, the most accurate results are obtained by making depreciation charges departmentally as the contract work passes through departments.

As depreciation can only represent a loss in actual capital investment, the charge in all cases must be calculated on the cost value of the assets. The contention has been raised that the market value of plant assets should be set up on the books and depreciation calculated thereon. This theory is entirely wrong. If the plant assets at cost as carried on the books are above the market value and the contractor wishes to reduce them to this value, he can do so only by writing off depreciation from the cost thereof. On the other hand, if the market value is in excess of cost and the plant assets are written up to agree with such market value, this would entail crediting profit and

loss or surplus with a fictitious profit and then writing off this fictitious profit at future dates in the form of depreciation. This procedure would be entirely unsound. It is well to emphasize again that depreciation can only apply to the amounts actually invested in plant assets and has nothing to do with their market value. If the contractor desires to sell his plant he may increase its valuation to the market value if such value is higher than cost, but this has nothing whatever to do with the question of depreciation.

Profit may be added to the depreciation charge for work on cost-plus contracts on the theory that as depreciation represents a loss in the value of the equipment used, it is as much a part of the cost as perishable tools which are entirely used up, or the depreciation on asset tools.

Guarding of Property

Police Protection

There are three kinds of police protection, namely, protection by military forces, by armed guards employed for the purpose, and by detectives. It is good business policy for armed guards to be employed for the prevention of damage to the plant whether or not governmental work is being done.

Where cost-plus work is handled, the contracts would naturally bear their proper proportion of this expense which should be charged to overhead. But where special guards are employed to guard government property, the expense would be chargeable in full to the government and should form part of the normal cost. If the contractor, when undertaking government work, increases the number of guards, the government should not bear all the cost, inasmuch as both property and profits of the contractor are thereby protected. Such protection is analogous to insuring the occupancy of business premises which naturally insures the capacity to make profits.

Where the plant is considered by the contractor to be sufficiently protected, prior to government work, and where the contractor is instructed to employ extra guards, all extra expense in connection therewith should be chargeable against the contracts provided that the cost-plus contracts are the only contracts being worked on. In other words, the excess cost which a contractor is obliged to incur on account of these contracts should be charged in full against such contract. In cases where the adequate protection of the contractor's property as a business proposition prior to government work has been neglected or not provided for, the contractor should bear a portion of this cost.

Guard House

Guard houses are small buildings erected for the use of the men who guard the plant—whether special police or watchmen. In the majority of cases these guard houses would be treated as a betterment or an asset addition to the plant, the whole expense of which would be borne by the contractor on the theory that he should properly safeguard his plant from theft, the loitering of undesirable persons, or malicious destruction. But where the protection is adequate for normal conditions and the contractor is requested to provide additional safeguards, such additional expense may be treated either as 100% overhead to the cost-plus contracts or as overhead for distribution. It would seem more equitable, however, to treat the whole expense as overhead, inasmuch as the plant is thereby receiving the benefit of extra security while engaged on profitable contracts.

Guards' Uniforms, Badges, and Other Equipment

The cost of the equipment of police guards who may be hired for the protection of special contracts should be limited to the amortization of any guard houses, the cost of wages,

and the cost of serviceable uniforms and badges which may answer the purpose intended. Overcoats, shoes, or puttees should not form a part of this cost, nor should the badges be expensive. The cost of all identification cards of employees should be charged to overhead expense inasmuch as the contractor participates equally with the buyer in such benefit.

Distribution of Protection Charges

Where the cost of police protection cannot be distributed by means of any of the standard methods, it may be allocated to the various contracts on the basis of the number of productive employees engaged on each.

Miscellaneous Expense Items

Blue-Prints

Blue-prints supplied by the contractor may be subject to costs and profit. If supplied by the buyer, no profit should be added thereto. All blue-prints charged to the cost-plus work should be accounted for at the end of the contract, as these documents may be of value to the buyer on other contracts.

Cash Discount

Any discount obtained by the contractor on direct material bought for and chargeable to cost-plus contracts, should be deducted from the purchase price. Indirect material and supplies are usually carried in stock, and information as to the amount used on cost-plus contracts may not be obtained until the end of the cost period. The following plan is suggested to take care of cash discount: Add the totals of indirect material and supplies which are chargeable to both cost-plus and other contracts; ascertain the percentages they bear to each other; use these percentages for the distribution of the cash discount in each case.

Drafting Expenses

Drafting expenses are ordinarily a direct charge against the job for which the drawings are made. In no case should a certain amount of this expense be charged to a cost-plus contract and the balance to overhead in which the contract also participates. Another method of handling the item as a direct charge is to treat it in the same manner as stated under the heading "Rebuilding, etc.," page 499.

Defective Work

Spoiled and defective work, if not more than the average amount under normal conditions, is allowed as an element of cost chargeable to cost-plus contracts; but if such work is the result of carelessness which could have been avoided by the exercise of reasonable diligence on the part of the contractor or his supervising agents, it is not allowed as an element either of direct or overhead cost.

Experimental Expense

When expense incurred on experimental work has a direct bearing on cost-plus contracts, it may be charged in full; and the same rule would, of course, apply to any contract. Work of this character is sometimes steadily maintained as a part of the fixed manufacturing policy, in which case, if it is of value to the cost-plus work, it may bear its proper share of the overhead chargeable thereto.

Employment Department

The maintenance of an employment department should be treated as an overhead expense and in no case as a direct charge against cost-plus contracts. The theory may be advanced that the contractor is compelled to open such a department if he is to secure good workmen and exclude undesirable employees. Nevertheless, as such a department obviously

tends to increase the efficiency of the whole plant, and the more efficient the plant the greater the earnings, all contracts should participate in the expense of maintaining the department.

Intercompany Expenses

A subsidiary company is sometimes charged with certain expenses incurred by the parent company. Any intercompany expenses should always receive particular attention to determine whether or not they are equitable as applied to cost-plus work. Usually a subsidiary company has a complete organization of its own. Therefore any charge from the parent company should consist only of a proper share of executives' salaries and any items of expenses expressly incurred on behalf of the subsidiary company. In other words, the subsidiary company should not be charged with a share of the general and administrative expenses of the parent company as a whole.

Patents and Royalty

No expenditures on patents, unless explicitly authorized by the buyer, should be charged to cost-plus contracts, even if such items are carried on the books of the contractor.

When royalty is paid currently on machinery or equipment in daily use, it may properly be distributed over all contracts, providing that the machinery upon which the royalty is paid is used in connection with all contracts, otherwise it is chargeable only to those which use that particular machinery. Where royalty is paid for a limited period of time at the expiration of which it ceases, it should be treated as a deferred charge applicable to future contracts.

Rental—Specific Charge for Same

If a contractor rents a storage building to be used exclusively in connection with cost-plus contracts, the rental would be chargeable in full. This does not, however, apply to space

in the factory or plant. The contractor is reimbursed for the use of his plant by charging off depreciation, taxes, insurance, repairs, etc., and the cost-plus contract bears its proper proportion thereof.

Scrap and Waste

The salvage value of scrap, waste, or containers used on cost-plus contracts should be deducted from the material or overhead cost of the work. Care should be taken to credit all current contracts with the salvage or scrap applicable thereto.

Selling Expense

Selling and a part of the administrative expenses should not be charged to government contracts. (See "Administrative Expenses," pages 518, 519.)

Testing Expense

Testing expenses should in the majority of cases be a direct charge against current contracts and not against overhead. A good rule to apply in connection with items of this character is to set up two accounts, Testing Expense Direct and Testing Expense Overhead. To the first account would be debited all direct charges against contracts, and to the second, all testing expenses which could not possibly be allocated to a particular contract.

Training Employees Expense

When employees are trained for the benefit of the business as a whole, the expense may be regarded as a regular overhead, but where trained for specific contract work, the expense should be charged to the contract in full.

Welfare Work

Expenditures on welfare work should be treated as a cost for distribution over all contracts and would include:

1. Wages paid employees while absent on account of illness.
2. Expenses of operation and maintenance of hospital; also medicine and first aid supplies to the injured.
3. Subscriptions to hospitals or other organizations to cover definite benefits to employees.
4. Net expense of operating restaurants.
5. Vacation allowances to wage earners.
6. Other expenses such as conducting club rooms, reading rooms, educational classes, etc.

These expenditures are allowable as cost on the theory that they promote cordial relations between employer and employee, and in that way tend to increase production without a corresponding increase in the cost.

Errors and Losses Due to Changes

Reclamation of Errors

All claims for errors should be a direct charge against a particular contract unless it is difficult to apply them specifically, in which case they may be classed as overhead and distributed over all contracts. It should be borne in mind that there are three classes of overhead expenses; first, overhead expense which under certain conditions may be charged in full; second, expenditures which must be divided between two or more contracts in specific amounts; and third, overhead which must be distributed on the same percentage basis over all contracts.

Changes in Specifications

Any losses through changes in the specifications should not be charged to cost-plus contracts unless the buyer has issued an order requiring such change, in which case the loss should then be treated as a direct cost item.

Items Not Chargeable Unless Strictly Applicable

Attorney Fees

No attorney fees for the collection of bad debts or any other element of expense which does not apply to cost-plus contracts should be chargeable thereto. Services rendered by attorneys in connection with purely organization matters, or charges of a general character when not excessive, may be treated as regular administrative expenses of which the cost-plus contracts would bear their proportionate share.

Bad Debts

Bad debts should not be regarded as cost under cost-plus contracts, unless such losses would apply to such contracts.

Brokerage Expenses

Brokerage incurred in connection with commercial paper should not be considered as a cost item, unless interest charges are allowed under the terms of the contract and brokerage is considered as a part of the cost of interest.

Donations and Entertainment

Donations to charity and gratuitous gifts should not be treated as cost items. They have no connection with the expense of manufacturing and are chargeable against the profits of a business.

Entertaining expenses, like donations and gifts, have nothing whatever to do with the manufacturing expenses of a business. The only theory upon which the expense of entertainment might be treated as cost would be when incurred for the benefit of the workmen. In such a case it would be allowable to charge it to welfare expense, as any work which promotes efficiency may be considered a legitimate part of the overhead.

Real Estate Investment, Expenditures, Etc.

Expenditures in connection with investments outside of the regular manufacturing expense should not be charged against current contracts. A special account should be opened for income and expenditures on investments so as to keep these items separate.

Reserves

Among the very few reserves which might equitably be charged as cost to cost-plus work are those for depreciation and pensions, or items of a similar character. Reserves for extraordinary repairs, contingent expenses, and like items should not be allowed as cost.

Engagement of Expert Services

The author is of the opinion that professional services rendered to a contractor for the benefit of the business as a whole, should be chargeable to overhead and prorated over all contracts as part of the administrative expenses of the business. But if an accountant were engaged specifically to look after the contractor's interests in connection with cost-plus contracts, such expenses should be borne wholly by the contractor.

CHAPTER XXXIII

SUSPENSION OR CANCELLATION OF CONTRACTS

General Considerations

The cancellation or suspension of any contract, whether on a fixed price or a cost-plus basis, may cause a contractor some loss unless the settlement covers compensation for obligations he has entered into in connection with the contract work. The possibility of loss is recognized by the United States Government in its contracts for munitions and supplies. Therefore, in most cases a cancellation clause protects the contractor, while the government, in its endeavor to be perfectly fair and just, has been more than liberal in its provision for possible losses due to the suspension of contract work.

Naturally, the precise terms of the cancellation differ in almost every case. In general, however, the clauses provide that the contractor shall be reimbursed for raw material, supplies, component parts, and work in process on hand at the termination of work on the contract, and that he shall be protected from loss on commitments or orders for material in transit or not yet shipped from the vendor. A provision is made, however, that the contractor shall not be reimbursed for a greater quantity of material than would have been required to finish the contract.

The general principle is also recognized of reimbursing the contractor for all obligations incurred solely for the performance of the contract, from which he cannot be released without suffering loss. It should be borne in mind, however, that no claims would necessarily be recognized unless they were covered by the provisions of the contract.

Reimbursement may be made to contractors upon the can-

cellation of a fixed price contract, a fixed profit contract, and a cost-plus contract. A general outline of the claims that might arise in each case is herewith given, but their recognition would depend upon the terms of a particular contract and whether or not these terms cover or allow the interpretation applied to the claim in question. The various items which may possibly be claimed are discussed under the heading of each kind of contract. Some of them are more or less of an intangible nature and, as such, very difficult to set forth as a claim. Claims cannot be made for a contingent or a possible loss, but must be based on actual and proven loss.

Cancellation of Fixed Price Contracts

Valuation of Inventory

At the termination of contract work, an inventory should be taken at cost of all items of raw material, component parts, goods in process, and supplies purchased or manufactured expressly for the contract in question. On these items the contractor may be entitled to an allowance for profit in addition to reimbursement. The profit on goods in process and parts manufactured may be ascertained by estimating the contract profit on a completed article and using the percentage of profit to cost to ascertain the profit on the cost of work in process. The cancellation clause in some contracts allows a 10% profit on the value of goods in process, in which case no further calculation need be made.

An itemized statement should be prepared of the commitments or unfilled orders which could not be canceled without loss and which could not be used for any other purpose than the contract in question.

The negotiation or settlement will be based on the inventories and statements referred to. In the majority of cases, much, if not all, the material both on hand and represented by unfilled orders could be used to good advantage, if

not by the contractor himself, then by some other concern in the same or another trade. It might be advisable in some cases for the contractor to dispose of the material to the best advantage and to be allowed a certain per cent to cover any possible losses in connection therewith. Each case would necessarily have to be judged separately. In the majority of instances there should not be much difficulty in disposing of raw material without loss, unless its market price has fallen.

The raw material cost can be readily determined, but the costing of goods in process will be a much more difficult matter if no cost system is in operation. Where cost data are not available, it would be well to use the estimating or engineering cost of an article as a basis for computing the material and direct labor costs, and then add an arbitrary percentage to cover the overhead. When this is done, the figures should be taken from the books in such a manner as to show that the cost represents a fair average.

Settlement of Commitments

The loss on commitments or unfilled orders may be incurred by others besides the prime contractor, and in such cases time is required to make the final adjustments.

As an illustration, assume that A, as a prime contractor, orders material or components from B, and B to fulfill his contract with A orders material from C, and C orders from another so that the commitments of A involve a score or more different concerns. In such a case the most practical solution to the tangle would seem to be the negotiation of a settlement with the prime contractor based upon a percentage of the unfilled orders, leaving to him the reimbursement of B and so on down the line. In other words, the contract could be terminated by a settlement with A to cover all claims, leaving to him and the other parties interested the settlement of their own trouble

Amortization

Practically two claims for amortization which may be allowed on fixed price contracts are:

1. Machinery, buildings, and equipment purchased during the term of the contract when the market price is lower at the termination of the contract.
2. Machinery, buildings, and equipment purchased during the contract and which should be amortized over the contract.

In the first instance the contractor would be penalized unless an allowance were made for the loss incurred. Thus if plant assets were bought for $100,000 during the term of the contract, and at its termination their market price had shrunk to $50,000, it would be necessary to charge off $50,000 in order to render a correct balance sheet.

In the second instance the contractor would be penalized if any items of machinery, buildings, or equipment which were not written off during the contract period were of such a special nature or so much in excess of the ordinary needs of his business that they could not possibly be used by him after the termination of the contract.

In the adjustment of either of these two claims on a straight price contract, the question of importance is whether or not the matters were covered in fixing the price. At the time that the price was negotiated, all known factors should have been considered and included in the cost upon which profit was figured. If this was the case, a claim under these circumstances would not be entertained. But if the purchase of the building or equipment in question was made after the date of the contract, and if the additions to the plant were not contemplated before the price was set and, furthermore, were necessary to the completion of the contract, then such a claim should be considered.

Where the plant additions were acquired prior to the date of the contract, or were contemplated and added after the date and for that reason were supposedly included in the fixed price, the question would still remain as to what proportion of their cost, if any, would remain for amortization after cancellation of the contract. If the cost of the plant addition were to be spread over the period of the contract, and the amortization were to be borne wholly by the contractor, an allowance should be made to him for that part of the amortization which he would have written off to himself during the period estimated as required for the completion of the contract.

Plant Rearrangement

While it is to be presumed that the plant of a contractor is equipped with all necessary facilities or that these will be provided for the carrying out of straight price contract work, nevertheless it is impossible to foresee all possible requirements which may arise. After work on the contract begins it may be advisable to rearrange the plant, if by so doing production can be speeded up. Under a fixed price contract, expenditures of this character would be treated as a deferred expense and prorated over the whole contract. Therefore, when such an expense has been incurred under the belief that the whole contract would be finished, the contractor should be allowed that portion which he would have written off against the unexpired portion of the contract.

Experimental Work

A great many contracts entail considerable preliminary expense for experimental purposes. If this expense is incurred only in connection with the contract, the same principle applies to plant rearrangement, i. e., the contractor should be allowed that portion of the expense which would have accrued to the unfinished part of the contract.

Special Tools

On practically every contract tools of a special character are used. If their cost is applicable to the whole contract, the item should be classed as one for reimbursement—as is the case with plant rearrangement and experimental work, discussed above.

Lease of Grounds or Building

If the contractor, to facilitate the carrying out of the contract work, has leased grounds and buildings and cannot dispose of the lease without loss at the cancellation of the contract, he should be reimbursed for only that period of the lease which would cover the expected time required to complete the contract. The contractor could not claim any expense for a lease extending beyond the period which the contract would naturally have run, unless an extra compensation were especially authorized in addition to the selling price in the contract.

Occupancy

When contract work necessitates an increase in plant facilities, compensation in the form of rent would be allowed for government buildings on the contractor's land and on the floor space occupied by machinery and equipment when such facilities are owned by the government. The compensation would continue until the government removed or otherwise disposed of the property in question.

Contract for Service

Various contracts for service may have been specifically entered into in connection with a fixed price contract, but if such service were limited and applicable only to the contract in question, then the contractor could claim whatever loss he might sustain for the unexpired portion of the contract.

Organization Expense

In a plant practically restricted to government work, the unlooked-for cancellation of contract work would result in a loss through inability to resume immediately ordinary commercial work. A claim for organization expense under these circumstances represents something tangible and it would seem that some portion of the contractor's administrative expenses incurred in resuming ordinary commercial work should be reimbursed.

Profits

A possible claim for profits may be made by a contractor although the contract fails to recognize a claim of this character. The question here arises: If a contractor is recompensed for actual loss, would that not also apply in some degree to losses of profit? Had the contract not been canceled, the contractor naturally would have made the same proportion and probably more profit on the uncompleted part of the work as compared with that completed. Moreover, his profit would be diminished in the interval between the cancellation of the contract and the resumption of normal business. Profit, however, could not be claimed for both of these losses, as naturally the profit which is allowable on the one would include the other.

Saving Clause in Contract

Some straight price contracts may contain a clause which allows the contractor a percentage of the savings in the use of raw material furnished by the buyer, such saving being the difference between the estimated quantity of material and that actually used. In a case of this kind it would seem that a contractor is entitled to his percentage of savings on the complete contract, based on the average savings made for the completed portion of the contract, providing that the saving clause

was taken into consideration in fixing the contract price of the completed article.

Cancellation of Fixed Profit Contracts

Difference Between Fixed Price and Fixed Profit Contracts

The distinction between a fixed price contract and a fixed profit contract is as follows: The fixed price contract simply states a selling price, the contractor assumes all costs, and his profit is the difference between his cost and the selling price. In a fixed profit contract, the contractor is reimbursed for all his costs under the contract and receives in addition a fixed profit for each article delivered. All of the elements as outlined in connection with the fixed price contract would also be considered in connection with the fixed profit contract, excepting that in this latter case they would be treated from a different standpoint.

It should be borne in mind that all regular expenditures incurred during the completed portion of the contract, and applicable thereto, should already have been taken care of. Therefore these items, if considered at all, should be considered only in connection with the effect produced upon them by the cancellation of the contract.

Inventory Items. As under a fixed price contract, compensation would be allowed and a fair proportion of profit determined by the percentage of profit applying to material and goods in process, taking into consideration the fixed profit on the article as a whole or according to the terms stated in the cancellation clause of the contract.

Commitments. The treatment of this item would be the same as under a fixed price contract.

Amortization. In connection with this item the contractor may be allowed reimbursement over the completed portion of the contract.

Plant Rearrangement. The contractor may be allowed

reimbursement with a percentage of profit on the completed portion of the contract.

Experimental Work, Special Tools, Leases, Contract for Service, and Organization Expense. In these cases the treatment would be the same as under a fixed price contract but the reimbursement would be for a fair proportion of the total amount chargeable to the completed portion of the contract. On the first three items enumerated a proper proportion of the profit might be allowed as in the case of inventory items.

Profits. These would be treated in the same way as under a fixed price contract.

It should be noted that the reimbursement of the above items depends solely upon their applying to a particular contract. If other contracts do not receive any benefit therefrom either before or after their cancellation, then the contractor should receive reimbursement for the total expenditures or total loss suffered. If, however, the expenditures on items of this character benefit other contracts either before or after the cancellation of the contract, then the contractor would be only entitled to a fair percentage of his expenditure or loss.

Saving Clause

Under some contracts the cost of the article to be manufactured is estimated and is called normal cost. When the contractor succeeds in reducing this normal cost, he participates in the saving thereof. Generally any fluctuation in the material prices requires that the normal cost be correspondingly revised. Some adjustment is necessary in this case where a contract is canceled.

Cancellation of Cost-Plus Contracts

Distinction Between Fixed Profit and Cost-Plus Contracts

The difference between a fixed profit and a cost-plus contract is that expenditures under a fixed profit contract are re-

imbursed only and the only profit allowable is on the article delivered; whereas in a cost-plus contract a profit is added to each item of cost directly incurred on contract work.

Inventory Items. These would be treated in the same manner as in the other contracts, excepting that a percentage of profit would be allowed in addition to reimbursement, according to the terms of the contract. The regular expenditures on the completed portion of the contract should have already been taken care of. Therefore, the effect produced upon the value of the inventory by the cancellation of the contract should alone be considered.

Commitments. These would be settled by reimbursement but no profit should be added.

Profits. These should be treated in the same way as under the other two forms of contract.

Amortization, Plant Arrangement, Experimental Work, Special Tools, and Leases on Grounds or Buildings. These items, if not adjusted before the cancellation of the contract, would be treated in the same manner as in a fixed profit contract—that is, reimbursement would be made but the profit allowed would be according to the terms of the contract.

Contract for Service; Organization Expense. These should be reimbursed without profit.

Saving Clause. This would be treated in the same manner as in the fixed profit contract.

The views expressed in connection with the cancellation of contracts should be distinctly understood to represent only the author's personal opinion and are not and should not be considered as written in any official capacity whatever.

INDEX

A

Account classification,
  changes in, 448
Accounting records,
  examination of, 437-438
Accounts,
  factory ledger controlling, 308, 315-337
  general ledger controlling, 293-314, 328
    operation of in estimating cost systems, 463, 466, 468, 473, 474, 476
Accounts payable voucher, 247-250
    Forms, 247, 248
  invoices grouped, 249
  operation of, 248, 249
  pay-roll record attached, 249
  voucher check, 249
Adjustments,
  discrepancies in cost, 335, 336
  factory ledger accounts and records, 335-337
  inventory, 335, 336, 378, 480
Administrative expenses, 18, 19
  treatment under cost-plus contracts, 518
Advertising,
  literature, aid to product classification, 42, 418
Allowances to customers, 21
Amortization,
  and depreciation, 154
    abnormal, 160, 161
    legal definition, 154-156
  government contracts, 542, 547, 549
  method of, data necessary for determining, 161
Analysis,
  of inventory, 465, 466
    Form, 467
  of sales and costs, 286-288
    Form, 287
Analysis record, 254-257
    Form, 256
  supplementary to voucher register, 254, 255
Application of cost principles, 10, 11
Appraisal of plant assets, 394
Article,
  cost,
    checking, 227, 228
    estimated, 460
Assembling departments,
  cost-finding method applicable to 29
Attorney fees,
  treatment under cost-plus contracts, 538

B

Bad debts,
  treatment under cost-plus contracts, 538
Balance sheet, 293
  comparative, 339
    Form, 341
  illustration of, 302
  preparation of, 301, 302, 306
Betterments,
  treatment under cost-plus contracts, 497
Bill of material, 84-86
    Form, 85
  order and process methods of cost-finding, 85, 86
Bin records, 77, 78
  proof of, 445, 446
Blue-prints,
    tracts, 533

Bonus (See "Wage systems, bonus")
Boot and shoe plants,
cost-finding methods applicable to, 28
Brokerage expenses,
treatment under cost-plus contracts, 538
Buildings,
depreciation rates, 146, 147, 152
mechanical equipment, 147
Businesses, cost classification of, 400

C

Cabinet shops,
cost-finding method applicable to, 26, 27
Calculation blank, 221-224
Form, 223
Canceled check attached to accounts payable voucher, 249
Cancellation of government contracts, 540-549, (See also "Government contracts")
Carlin, Captain J. P., quoted on maximum percentage for overtime, 158-160
Cash,
accounting for, 295-298
Cash discounts,
treatment under cost-plus contracts, 533
Cartage inward (See "Freight and cartage inward")
Catalogues,
aid to product classification, 42, 418
filing of, 71, 72
Charges,
direct, 13
indirect, 16, 17 (See also "Overhead")
to jobs, analysis of, 264
Charging factory expenditures, 243-265
Charts,
analysis of elements of cost, 23
classification of—
cost summary records, 292, 313, 314
factory departments, 41
factory orders, 56
labor reports, 121
overhead, 183
overhead reports, 197
production reports, 208
factory ledger controlling accounts, 330, 332
financial and factory statements, 374
showing application of methods of cost-finding, 33
showing handling of material and material reports, 95
Chemical manufacturing plants, cost-finding methods applicable to, 21
Classification of,
accounts, changes in, 448
departments, 35-40
changes in, 448
chart showing, 41
enterprises, 400-402
inventory, method of, 444
product, 40, 42, 43, 418, 448
at installation of cost system, 418
changes in, 448
Clerks, factory,
charging salaries of, 133, 134
Coal-mining,
cost-finding method applicable to, 32
Consignment records, 236
Construction work,
cost-finding method applicable to, 25, 26
Contracts,
cancellation of government, 540-549 (See also "Government contracts")
cost-plus (See "Cost-plus contracts")
Contract, wage system, 106
Controlling accounts,
factory ledger, 315-337
adjustments, 335, 336
classification of, 315, 331-333
Forms, 332, 333
closing of accounts, 336, 337
discrepancies, treatment of, 335-337

Controlling accounts—*Continued*
factory ledger—*Continued*
factory journal, 316
form of, 331
general ledger, 328, 329
methods of keeping, 315
summarizing chart, 330
verification of accounts, 333-335
finished stock, 307, 308, 323
posting to, 324
general ledger, 293-314
arrangement of accounts, 308-310
entering costs, 296-298
grouping, 311- 312
subsidiary ledgers or analysis records, 311, 312
indirect expense, 325-327
Forms, 326
inventory, 299, 300, 303, 304
divisions and subdivisions of, 306-308
factory ledger, 308
methods of valuing merchandise, 299, 300
proving balances, 306, 307
part-finished stock, 320-322
posting to, 322, 323
productive labor, 324, 325
raw material, 306, 307, 316, 317
posting to, 317, 318
work in process, 307, 308, 318, 319
Forms, 321
posting to, 319, 320
special and standard products, 318
Control of cost records, 293-337
cash transactions, 295-298
chart of cost summary records, 313, 314
illustration of ledger accounts, 296-298
income and expense accounts, 294-337
methods of, 293
pay-roll and pay-roll analysis, 295
purchase transactions, 294, 295
records of sales transactions, 295
Cost,
classification of enterprise, 400
compilation, examination of method of, 436
elements of (See "Elements of cost")
factory, 20
ledger, 315
material (See "Material, cost")
of sales,
method of ascertaining, 454
method of obtaining, 457
recording estimated costs, 478
records, 276-281
sales and cost of sales records combined with shipping order, 276, 280
Forms, 278, 279
shipping records, 276
Form, 277
summary, 283, 464
Form, 463
treated separately, 280
period, 243
principles, application of, 10, 11
product (See "Product, cost")
Cost accountant,
need of, 399
work of, 400
Cost accounting,
functions and province of, 4, 5
relation to general accounting, 5
Cost conference,
recommendations of interdepartmental, 487-494
forms and methods, 493
summary of recommendations, 493
Cost department,
examination of, 428
ledger, 315
Cost-finding,
importance of, 3
methods of, 24
chart showing application of, 33
order (See "Order method of cost-finding")
process (See "Process method of cost-finding")
requirements of, 24
uniform methods of, 11 (See also Cost methods. uniform")

Cost-finding—*Continued*
uniform methods of—*Continued*
advantage of, 12
out-growth of trade associations, 11
uniform selling price insured by, 12
Cost methods,
haphazard, examples of, 482, 483
uniform, 481-486
advantages of, 481, 482
selling price based on, 481, 482
standardizing costs, 483-485
Cost of returns summary, 285, 286
Cost-plus contracts, 487-539
additions and special facilities, treatment of, 497
administrative expense, treatment of, 518
salaries, 518
betterments and equipment, treatment of, 497-501
additions, 497
fixtures, 499
freight and express on equipment, 500
housing of laborers, 501
monorail system, 501
office furniture and fittings, 499
rebuilding, 499
renovating, 499
setting up machines, 501
special equipment, 499
special facilities, 497
bonus payments, treatment of, 519
cancellation of, 548 (See also "Government contracts")
changes in specifications, treatment of, 537
deferred overhead charges, 517
preliminary expenses, 517
depletion, treatment of, 528
depreciation, treatment of, 528
fair terms, what constitutes, 488
fixed price, 488
fixed profit plan, 491
forms and methods, 493
freight, treatment of government taxes on, 524
idle and waiting time, treatment of, 514-515
insurance, treatment of, 521-524
items not chargeable unless applicable to, 538, 539
material and supplies items, treatment of,
drayage, 504
inventory adjustments, 504
obsolete material, 503
overs, 503
packing supplies, 504
shortages, 503
spare parts, 505
transfers of inventory items, 505
miscellaneous items, treatment of, 533-539
blue-prints, 533
cash discount, 533
defective work, 534
drafting expense, 534
employment department, 534
experimental expense, 534
intercompany expenses, 535
patents, 535
rental, 535
royalty, 535
scrap waste, 536
selling expense, 536
testing expense, 536
training employees expense, 536
welfare work, 536
normal costs, 494
overhead, treatment of,
direct and indirect distribution, 516
distribution over broken cost periods, 516
products made in bulk, 517
overtime, treatment of, 513
pensions, treatment of, 520
police protection, treatment of, 531
purchase-and-sale contract, form of, 490
relations between government and contractor, 491
repairs and renewals, treatment of, 501-502
special rulings, 497

taxes, treatment of, 521
terms of contract, 496
tools, treatment of, 507-509
asset tools, 507, 512
classification of, 508
distinction between tools and machines, 507
handling, 510
identification, 513
method of accounting for, 512
Form, 511
perishable, 512
repairs and replacements, 513
salvage of, 512
scrap value of, 508
storage, 510
treatment of interest on, 524
borrowed money, 525
equipment, 527
inventories, 526
plant, 527
working capital, 526
Cost records (See also "Cost sheets," "Stock records")
and financial records, interlocking, 5, 300-337
control of (See "Control of cost records")
scope of, 5
summarizing (See "Summarizing cost records")
Costs,
advantages of showing separately, 8
article, estimated, 460
checking, 227, 228
cost sheet basis for charging to stock accounts, 211
defective work, summary of, 272
departmental analysis of, 485
detailed summary of, 218-221
Forms, 219, 220
estimated (See "Estimated costs" also "Estimating cost systems")
machine, statement of, 371
Form, 372
manufacturing, 13-23
material, 91-93
posting to cost sheets (See "Cost sheets, posting")
sales records combined with, 286-288
Form, 287
shop order, summary of, 270, 272
Form, 271
standardizing, method of, 483-485
statement of, 366, 368
Forms, 367, 369
time of compiling, 226, 227
Cost sheets, 211-230
classification chart of, 229
compilation of, 408
controlled by work in process accounts, 318
copy of production order used as, 60, 61
departmental, 216-218
Forms, 216, 217
conditions under which used, 218
details shown on, 215
envelope form, 224, 225
filing, 230
form of, 211
headings,
information contained in, order method, 214
preparation of, 214
inventory of work in process, 215, 233
job or order, 212
posting, 224-227
labor reports, 225
material reports, 224, 225
mechanical aids for, 226
overhead costs, 225, 226
quantities, 226
time of compiling data, 226, 227
procedure in handling, 228, 229
process method, 212-214
Form, 213
labor and overhead costs combined, 226
progressive, 221
Form, 222
scope of, 211
simple form of, 215
Form, 216

Cost sheets—*Continued*
summarizing,
adjustments, 228
records connect with stock reports, 242, 243
summary of costs, detailed, 218-221
Forms, 219, 220
tag or ticket form of, 215, 216
Form, 216
verification of, 335
Cost summarizing records, 242-292
charging factory expenditures, 242-265
chart showing, 291
cost of sales, 276-288
analysis of sales and costs, 286-288
Form, 287
cost of returns summary, 285-286
return credit record, 283-285
Forms, 284, 285
sales records, shipping and billing records combined with, 276-281
Forms, 277, 278, 279
sales summary, 281-283
Form, 282
defective work, 272
departmental material used, 269
departmental transfers,
labor, 269- 270
material, 269
examination of, 437
material requisition, 266-269
Form, 267
combined with distribution record, 268
overhead distribution, 272-274
Form, 273
posting, 409
preparing, 243, 409
purpose of, 242, 243
shop order costs, 270-272
Form, 271
stock transfers, 269
summary of material received, 258-261
Form, 258
summary of production, 275
Form, 274
transfers within the factory, 266-275
Cost systems,
advantages of, 8-10
discrepancies, treatment of, 335
elementary, 451-458
applied to several product classifications, 455
kinds of, 410
method of starting, 442-447
classification of inventory, 443
classification of product and departments, 448
overhead distribution, 447
reports and records, 448
starting factory orders, 446
test of records, preliminary, 442
objections to, 5-7
Cost systems, method of installing, 7, 399-449
accounting records, examination of, 437-438
adjustment to existing conditions, 404
auxiliary mechanisms, examination of, 440
examination of departments, (See "Departments, examination of")
examination of existing system, 415
efficiency details, 417
information,
method of obtaining, 441
miscellaneous, required, 439
internal problems, 402
introduction of estimating system, 404
labor reports, examination of, 433
overhead items, examination of, 434
procedure for examination of plant, 418
product classification, 418
production records, examination of, 435
cost compilation, method of, 436
cost summarizing, 437
finished parts, 435
finished stock, 435

Cost systems, methods of installing —*Continued*
red-tape pitfalls, 405
reports,
for executives, 405
of method, 413
statements, examination of, 438
summary of procedure, 406
charging factory, 407
charging production to stock, 409
compiling costs, 408
costing sales, 409
crediting production, 408
delivering material, 408
distributing overhead, 409
preparing and posting summaries, 409
preparing and proving trial balance, 410
preparing statements, 410
proving pay-rolls, 407
proving the subsidiary records, 410
receiving and storing material, 407
Cost tag, 215, 216
Form, 216
Credit for material returned, 86, 88
Form, 87
Crediting,
merchandise returned, 283-285
Forms, 284, 285
work done for administrative and selling departments, 288

D

Day-rate wage system (See "Wage systems, day-rate")
Defective work,
charging,
overhead, reports for, 190
time spent on, 134
costs, summary of, 272
recording, 134
repair or disposal of, 52
reports, 204-206
Forms, 205
treatment under cost-plus contracts, 534
Deferred charges,
applicable to cost-plus contracts, 517
Departmental,
analysis of costs, 485
and product classification, 35-43
cost sheets, 216-218
Forms, 216, 217
divisions, designation of, 37, 38
material report, 88
Form, 89
material used, summary of, 269
storerooms, stock records for, 233
transfers of labor, 269, 270
transfers of material, 186
material transfer reports, 89, 90
Form, 90
summary of, 269
Departments,
administrative,
crediting work done for, 288
examination of, 419-431
cost, 428
dry kilns, 425
estimating, 428
foundry, 424
packing, 427
plating, 425
power, 426
purchasing, 430
receiving, 431
sales, 419
shipping, 427
stores, 431
wood-working, 425
factory, classification of, 35-40
changes in, 448
chart showing, 41
miscellaneous, 39
distribution of expenses, 39
non-productive, 38
distribution of expenses, 38
productive, 36-38
basis for establishing, 36

Departments—*Continued*
productive—*Continued*
"center" grouping of operations, 36
designation of departmental divisions, 37
proving estimated costs by, 475, 476
purchasing (See "Purchasing department")
sales (See "Sales department")
Depletion,
treatment under cost-plus contracts, 529
Depreciation,
and amortization, 154
abnormal, 160, 161
legal definition, 154-156
charging off, method of, 153, 154
charging to machines, 175
distribution, fixing rate for, 144
effect of overtime on, (auditor steel company quoted), 156-158
fixed charge, 190, 191
rates,
building, 146, 147
equipment, mechanical building, 147
equipment, miscellaneous, 150, 151
equipment, plant, power, etc., 147, 148
factors to consider, 145
group, 152, 153
land, 146
machinery, 149, 150, 152, 153
method of obtaining, 144
plant assets, 398
schedule of, 145-151
special machinery, 153
standard, basis of, 151
tools and dies, 150, 152, 153
repairs and renewals, effect of, 144, 145
treatment under cost-plus contracts, 528
method of figuring, 530
Design of forms, reports, records, etc., 411
Dies, valuation of, 398
Discounts,
cash, 21-23
trade, 21
Distribution,
of overhead (See "Overhead")
record, 254-257
Form, 256
Donations,
treatment under cost-plus contracts, 538
Drafting expense,
treatment under cost-plus contracts, 534
Drayage,
chargeable to cost-plus contracts, 504
Dry kilns, examination of, 425

E

Efficiency,
importance of, 1
of factory, increased by standardized units of production, 49
progress of, 2
through trade associations, 11
Elements of cost, 13-23
administrative expenses, 18, 19
chart showing analysis of, 22
direct charges, 13-16
indirect charges, 16, 17 (See also "Overhead")
packing expense, 17
relation to selling price, 19, 20
diagram showing, 20
selling and shipping expenses, 18
Employees,
absence and tardiness, record of, 117, 118
Form, 118
office, salaries entered on separate record, 265
Employment department,
treatment under cost-plus contracts, 534
Entertainment expenses,
treatment under cost-plus contracts, 538

Equipment,
changes, statement of, 349
depreciation rates, 147-153
building equipment, mechanical, 147, 152
miscellaneous equipment, 150, 151
plant, power, and large equipment, 147-149, 152
interest on, chargeable to cost-plus contracts, 527
transfer between departments, 396
treatment under cost-plus contracts, 499
valuation of, 391
Estimated costs,
and actual costs, accounts showing difference between, 463
cost sheets used for, 216-218
Forms, 216, 217
of sales, summary of, 462
Form, 464
schedules of, 221-224, 462
Forms, 223, 463
verification of (See "Estimating cost systems")
Estimating cost systems, 459-480
adjusting inventory, 480
advantages of, 460
features of, 459, 460
method of operating, 460, 461
verification by lots or groups, 470-475
analysis of opening inventory, 472
labor costs, 471, 472
ledger accounts, operation of, 473, 474
method of, 474
overhead costs, 472
raw material costs, 471
special records required, 470, 471
verification by operating departments, 475-480
charges for expenditures, 477, 478
crediting production, 478
general ledger accounts, 476
method of, 479, 480
recording cost of sales, 478
special forms required, 475, 476
verification of material, labor, and overhead estimates, 465-470
analysis of inventory, 465, 466
Form, 467
ledger accounts, operation of, 466, 468
method of, 468-470
special records required, 465
Forms, 463, 464
verification of total costs, 462-465
general ledger accounts, 463
method of, 464, 465
special records required for, 462
Forms, 463, 464
Estimating department, examination of, 428
Examination of plant, 414-441 (See also "Departments, examination of")
Expense,
administrative, 18, 19
treatment under cost-plus contracts, 518
deferred,
treatment under cost-plus contracts, 517
direct, 13, 15, 16
distribution over cost-plus contracts, 516-539 (See also "Cost-plus contracts, overhead distribution")
general operating, 39, 40 (See also "Overhead")
indirect, 16, 17 (See also "Overhead")
packing, 17
preliminary,
treatment under cost-plus contracts, 517
selling, 18
Experimental work,
charging time spent on, 134, 135, 190
expense departmentalized, 38
treatment,
under cancellation of government contracts, 544, 547, 549
under cost-plus contracts, 534

F

Factory,
charges, source of, 407
cost, 20
departments (See "Departments, factory")
expenditures, charging, 244-265
expenses, statement of, 370
Form, 371
ledger,
controlling accounts, 308-310 (See also "Controlling accounts, factory ledger")
posting from pay-roll analysis, 262-264
method of crediting, 408
orders, 45-46 (See also "Orders, factory")
overhead (See "Overhead")
production orders,
examination of, 429
starting new orders, 446
Federal Trade Commission,
recommendations of, as to cost-plus contracts, 487
Filing,
catalogues, 71, 72
cost sheets, 230
orders,
production, 60, 61
purchase, 70
sales, 64
price lists and quotations, 71, 72
reports,
labor, 125
material, 97
production, 209
stock records, 241
Financial records and cost records, interlocking, 5, 300-337
Financial statements (See "Statements")
Finished parts,
inventory, pricing of, 389
part-finished stock, distinction between, 51
production orders for, 50, 51
records, examination of, 435
stock records, 234
Finished stock,
controlling accounts, 307, 308, 323
posting to, 324
inventory, pricing of, 389
production orders for, 50, 51
records, 234
examination of, 435
Fixed charges, 190, 191
depreciation, 190, 191
insurance, 190, 191
interest, 190, 191
rent, 190, 191
Form, 191
taxes, 190, 191
Fixed price contracts, cancellation of, 541 (See also "Government contracts")
Fixed profit contracts, cancellation of, 546 (See also "Government contracts")
Fixtures, treatment of, 397
under cost-plus contracts, 499
Flasks, valuation of, 398
Foodstuffs, manufacture of, cost-finding method applicable to, 32
Foremen,
charging time of, 132, 189
salaries entered on separate record, 265
Forms, design of, 411
Foundries, cost-finding method applicable to, 30
Foundry department, examination of, 424
Freight,
and cartage inward, charging to overhead, 141, 142, 195
and express on equipment, for cost-plus work, 500
government taxes on, treatment under cost-plus contracts, 524

G

Gain-sharing, wage system, 105
Gantt plan, wage system, 103
Garment manufacturing plants, cost-finding methods applicable to, 27

General ledger,
accounts,
estimating cost systems, 464, 466, 468, 473, 474, 476
on factory ledger, 328, 329
entering controlling accounts, 296-298
Gifts, method of charging, 130, 131, 379
Government contracts (See also "Cost-plus contracts")
cancellation of, 540-549
amortization, 542, 547, 549
commitments, 542, 547, 549
experimental work, 544, 547, 549
general considerations, 540
inventory valuation, 541, 548
leases, 545, 549
occupancy, 545
organization expense, 545, 549
plant rearrangement, 544, 547
profits, 545, 548
special books, 544, 547, 549
survey clause, 546, 548, 549
distinction between,
fixed price and fixed profit, 546
fixed profit and cost-plus, 548
Guard house and equipment,
cost of, chargeable to cost-plus contracts, 532

H

Hat manufacturing plants,
cost-finding methods applicable to, 27, 28
Heat (See "Power, light, heat")
Helpers, charging time of, 132, 188
Housing of work people, treatment under cost-plus contracts, 501

I

Ice manufacturing plants, cost-finding method applicable to, 32
Idle time (See "Time, lost and idle")
Income tax,
treatment under cost-plus contracts, 524
Indirect,
expense (See "Overhead")
labor (See "Overhead")
material (See "Overhead")
Inspection,
charging time of, 133, 189
expense departmentalized, 38
Installation of a cost system, 399-413 (See also "Cost systems, method of installing")
Insurance,
distribution of charges, 136, 137
fixed charge, 190, 191
provision for plant assets, 398
treatment under cost-plus contracts, 521-524
Interdepartmental cost conference, recommendations of, 487-492
Interdepartmental material reports, 91
Form, 90
Interest,
distribution of, 138-140
including as cost,
advisability of, 138, 139
method of, 140
on mortgage,
charging to overhead, 136, 137
fixed charge, 190, 191
treatment under cost-plus contracts, (See "Cost-plus contracts")
Interlocking and agreeing reports, 376
Interlocking financial records with cost records, 5, 300-337
Inventory,
adjustments, 335, 336, 378, 480, 504
under cost-plus contracts, 504
analysis of, 303, 304
Form, 467
balances, entering on stock records, 239
classification, method of, 443
controlling accounts (See "Controlling accounts")
cost systems provide, 8
interest on, chargeable to cost-plus contracts, 527

Inventory—*Continued*
merchandise, comparative statements, 349
Form, 350
methods of taking, 377-391
checking, 390
figuring, 390
instructing employees, 382
listing, 386
pricing, 232, 387, 388
preparation, 381
proving, 93, 232, 303, 306, 307, 378, 390, 445
Form, 93
opening, analysis of, 472
perpetual, 94 (See also "Stock record")
advantages of, 231
factory ledger accounts, 336
stock records provide, 81, 231
physical, 379
power plants, small, 194
raw material, 92-94
Forms, 93, 94
sheet, 93, 379
Forms, 94, 380
tag method, 384
Form, 385
transfers of items under cost-plus contracts, 505
valuation,
closing, 451
merchandise, 299, 300
under government contracts, 541, 548
Invoice book, 245, 247
Invoices,
estimated costs entered on, 478
from creditors, 76
checking, 76
Form, 77
purchase (See "Purchase invoices")
used as stock record for outside work, 238

J

Job cost-tickets (See "Cost sheets")
Job method of cost-finding, 25 (See also "Order method of cost-finding")
Journal,
entries, 288, 291, 316
Form, 290
vouchers and standing journal entries, 288-291
Forms, 289, 290

L

Labor,
direct, 15 (See also "Labor, productive," below)
indirect, 16, 17 (See also "Overhead, labor, indirect")
Labor, productive,
classification of, 108
controlling accounts, 324
departmental transfers of, 269, 270
estimated costs, verification of, 465-470
Forms, 463, 467
grouped operations, 471, 472
method of reporting, 110-112
mechanical devices, 110, 111, 113
standardized forms, 111
outside and inside the plant, 108
reports, 109-125
calculating, 123, 124
chart showing classification, 121
collecting, 123
combination reports for groups, 113
combined with production orders, 59-61
disposition of indirect time appearing upon, 112
examining, 123
filing, 125
indicating accounts to be charged, 124
information furnished, 113
pay-roll, 259-261
Form, 260
pay-roll analysis, 261-264
Form, 263
pay-roll exception, 117, 118
Form, 117

Labor, productive—*Continued*
reports—*Continued*
pay-roll summary, 265
posting to cost sheets, 225
posting to pay-roll and cost records, 125
preparing, 122
pricing, 123
procedure for handling, 122-125
production order combined with, 116, 117
purposes of, 109
rate records, 119, 120
Form, 120
requirements of, 112-114
time, 115-117
Forms, 114, 115, 116
transfer, 118, 119
Form, 119
used as production reports, 204
verbal, inadequate, 112
wage rate records included on, 119, 120
Form, 120
standardization of costs, 484, 485
time of reporting, 109, 110
transferring to non-productive work, 188
Land, depreciation rates, 146
Life insurance premiums,
treatment under cost-plus contracts, 523
Light (See "Power, light, heat")
Lot or group costs, estimated (See "Estimating cost systems")
Lost and idle time (See "Time, lost and idle")

M

Machine,
costs, statement of, 371
Form, 372
installation,
treatment under cost-plus contracts, 499
Machine-cost method, 30 (See also "Process method of cost-finding")
Machine-rate methods, overhead distribution, 173-178
application of, 173, 174
compiling rate, 175, 176
fixed machine rate, 177
forms of, 174
sold-hour method, 177, 178
Machinery,
depreciation rates, 149, 150, 152, 153
Machines,
constructed on plant, valuation of, 395
installation, expense of, 395
treatment of,
construction cost, 395
cost of transfer, 396
valuation of parts, 397
Maintenance, repairs and renewals,
charged against depreciation, 161, 162
effect on depreciation, 144, 145
method of recording charges, 192, 193
summary of maintenance and repair costs, 270-272
Form, 271
Manufactured parts, 51
Manufacturing ledger, 315
Manufacturing statement, 343-348
Forms, 344, 345
Material,
bill of, 84-86
Form, 85
cost,
methods of figuring, 91, 92, 93
storeroom overhead added to, 91, 92
delivery to operation, 408
direct, 13, 14
estimated costs, verification of, 465-470
Form, 467
handling, procedure in, 65
indirect, 16 (See also "Overhead, material indirect")
inventory (See "Inventory")
issuance of, 82

Material—*Continued*
issued,
disposition of, 88
reporting, 88, 91
Form, 89
pricing, 91, 92, 93
methods of figuring fluctuating costs, 92, 93
scrap material, 91
purchasing, 65
raw (See "Raw material")
receiving record, 72, 73, 407
Form, 73
records (See "Stock records")
reports, 66-97
calculating, 97
chart showing classification of, 96
collecting, 95
departmental, 88
Form, 89
departmental transfers, 186
designating accounts to be charged and credited, 97
examining, 95
filing, 97
for charging factory overhead, 185-188
interdepartmental, 91, 186
Form, 90
material received, 74-76
Form, 75
material received, copies of purchase orders used as, 74- 76
material transfer, 89, 90
Form, 90
material used, 88, 91
Form, 89
numbering, 95
posting to cost sheets, 224, 225
pricing, 95, 97
procedure in handling, 95-97
purchase requisition, 66-68
Form, 66
posting to stock records, 97
summarizing and proving for accounts, 97
summary of departmental transfers, 269
summary of material received, 257-259
Form, 258
summary of material used, 269
used as production reports, 203, 204
requisition (See "Requisition, material")
returned credit slip for, 86
Form, 87
scrap,
record of, 128
direct and indirect charging of, 127-129, 186, 187
storing, 77, 407
supplies, direct and indirect, charging of, 127, 186-188
tools and dies, perishable,
direct and indirect, charging of, 129, 187
transfer, 91, 186
Form, 90
treatment under cost-plus contracts, 503
Mechanical aids for posting costs, 226
Mercantile business, cost systems for, 401
Merchandise inventory, comparative statement, 349
Form, 350
Merit plan, wage system, 105
Metal-working plants, cost-finding method applicable to, 28, 29
Miscellaneous,
departments (See "Departments, miscellaneous")
expenses, factory,
distribution of, 142, 143
factory orders, 52-54 (See also "Orders, factory, miscellaneous")
overhead distribution methods, 178, 179
supplies, 127
Molds, valuation of, 398
Monorail system,
treatment under cost-plus contracts, 501

Munitions Tax Law, Treasury Department,
depreciation and amortization definition, 154-156

N

Non-productive departments (See "Departments, non-productive")
Non-productive labor (See "Overhead, labor, indirect")
Normal costs under cost-plus contracts, 494

O

Obsolescence, 154
Obsolete material,
treatment under cost-plus contracts, 503
Obsolete stock,
statement of, 361
Form, 362
record, 241
Office furniture,
treatment under cost-plus contracts, 499
Operating departments (See "Departments, productive")
Operations, grouping of, "center," 36
Order method of cost-finding, 24-29
and process method, 24-34
chart showing application to industries, 33
applied to,
assembling departments, 29
boot and shoe plants, 28
cabinet shops, 26, 27
chemical manufacturing plants, 31
construction work, 25, 26
garment manufacturing plants, 27
metal manufacturing plants, 28-29
paint and varnish manufacturing plants, 31
plating shops, 26
repair shops, 26
straw and felt hat plants, 27
wood-working plants, 28
designation of order and production report, 200
distinctive features of, 24
Order numbers, 45, 54
Order register, 60
standing orders, 54
Orders,
factory, 45-64
chart showing classification, 56
miscellaneous, 52-54 (See also "Orders (factory), miscellaneous" below)
production, 47-52, 55-64 (See also "Orders, (factory) production" below)
small, grouping of, 49, 50
sub-production, 49
purchase, 68-70
Form, 69
copies used as material received reports, 74-76
filing and disposition of, 68, 70
purchase requisition combined with, 70
register of, 70
Form, 71
sales, 61-64
Form, 62
filing, 64
registering, 63, 64
shipping, 60, 61, 276-280
Form, 277
combined with billing and cost of sales records, 276-281
Forms, 278, 279
copy of factory order used as, 60, 61
stores (See "Requisition, material")
verbal, inadequacy of, 45, 46
written, 46, 47
Orders (factory), miscellaneous, 52-54
betterment, 53
classification of, 52
construction, 52, 53
repairs, 53
standing, 54
charging time and material on, 54

Orders (factory), production, 48-52, 53-64
classification of, 48
combined with material requisition, 59, 60
copies, number of, 57
copy used as shipping order, 276
Form, 277
designing form for, 55
development of, 58, 59
duplicate copy,
used as cost sheet, 60, 61
used as shipping order, 60, 61
examination of, 429
filing and disposition of, 60, 61
finished parts, 50, 51
for manufacture of parts, 50, 51
information to be included in, 55, 57, 58
issuance of, 55-57
labor reports combined with, 59-61, 116, 117
production report used as, 59-61
quantities, designation of, 48, 49
repairs to product, 52
simple form of, 57, 58
Form, 58
special, 50
standard, 50, 51
starting new orders, 446
tag and coupon system, 202, 203
used as production report, 59-61, 201
Overhead,
chart showing classification and distribution, 183
classification of, 16, 17, 126
controlling accounts, 304, 325-327
Form, 326
costs, uniform methods of treating, 484, 485
deferred charges, 517
departmental application of, 126-143
distribution of, 163-189, 409
adjustment to changed conditions, 181-184
adjustments of rate, 334
bases of, 178, 179
direct and indirect, 163, 164, 516
fixed rates, 180
fluctuating rates, 180, 181
information necessary for establishing methods, 434, 447, 448
machine-rate methods, 173-178
miscellaneous methods, 178, 179
over cost-plus contracts, 516
over products made in bulk, 517
prime-cost method, 166-169
productive-labor-cost method, 169-171
productive-labor-hours method, 171-173
sold-hour method, 177, 178
entering costs on cost sheet, 225, 226
estimated costs, verification of, 465-470
Form, 467
group method, 472
expense items, 17, 135, 162, 190-197
depreciation, 144-161 (See also "Depreciation")
freight and cartage inward, 141, 142, 195
insurance, 136, 137, 190, 191
interest, 138-140, 190, 191
maintenance, repairs, and renewals, 161, 162, 192-193
miscellaneous expenses, 142, 143
over, short, and damage, 142, 195, 196
power, light, heat, 141, 193-195
Form, 194
rent, 136, 190, 191
Form, 191
taxes, 137, 190, 191
general operating expenses, 39, 40, 164, 165
labor, indirect, 16, 17, 129-135, 188-190
bonuses not based on production, 130
defective work, employees on, 134, 190
experimental work, 134, 135, 190
foremen, supervisors, 132, 189

Overhead—*Continued*
labor—*Continued*
helpers, sweepers, truckers, repairmen, 134, 188
inspection, 133, 189
lost and idle time, 131
salaries, factory clerks', 133, 134, 189, 190
superintendence, 132, 133, 189
material, indirect, 16, 126-129, 185-188
scrap or waste material, 127-129, 186, 187
supplies, 127, 187, 188
tools and dies, perishable, 129, 187
miscellaneous departments, 39
non-productive departments, 38
records and reports, 185-196, 254-237, 259-264
charging expense items, 190-196
Forms, 191, 194
classification chart of reports, 197
deferred expense record, 196, 197
distribution or analysis record, 196, 254-257
Form, 256
fixed charges, 190, 191
Form, 191
pay-roll or pay-roll analysis, 259-264
Forms, 260, 263
reporting time of non-productive labor, 188-190
reports for recording indirect material, 185-188
summary of distribution, 272-274
Form, 273
storerooms, 91, 92
time factor of, 173
Over, short, and damage,
charging to overhead, 142, 195, 196
Overtime,
effect on depreciation, 156-158
maximum depreciation percentage for (Captain J. P. Carlin, quoted), 158-160
treatment under cost-plus contracts, 513

P

Packing department, examination of, 427
Packing expense, 17
Packing supplies,
treatment under cost-plus contracts, 504
Paint and varnish plants, cost-finding methods applicable to, 31
Paper mills, cost-finding method applicable to, 30
Part-finished stock, 50, 51
controlling accounts, 320, 322
posting to, 322, 323
finished parts, distinction between, 51
production orders for, 50, 51
Patents,
treatment under cost-plus contracts, 535
Patterns, valuation of, 398
Pay-roll, 259-261
Form, 260
analysis, 261-264
Form, 263
charges to jobs, 264, 265
posting to ledger, 262, 264
purpose of, 261, 262
classification, 265
deductions from, 261
exception report, 117, 118
Form, 117
method of keeping, 261
period, cost period in agreement with, 243
posting labor reports to, 125
proving and charging, 407
record attached to vouchers, 249
summary, process method, 265
Pensions,
treatment under cost-plus contracts, 520
Physical inventory, 379 (See also "Inventory")
Piece-rate,
wage plan (See "Wage systems, piece-rate")

Piece-work,
wage systems (See "Wage systems, piece-work")
Plant,
additions to,
treatment under cost-plus contracts, 497
and equipment,
interest on, chargeable to cost-plus contracts, 527
changes, statement of, 349
examination of, 414-444 (See also "Cost systems, method of installing")
Plant assets,
appraisal of, 398
dies, molds, etc. considered as, 398
fixtures, control of, 397
machines,
construction of, 395
expense of installing, 395
transfer, 396
valuation of machine parts, 397
statement of changes in value, 398
tools treated as, 396
control of, 397
method of safeguarding, 397
records, 391-398
Forms, 392, 393
method of filing, 394
purposes of, 394
Plating room, examination of, 425
Plating shops, cost-finding methods applicable to, 26
Police protection,
distribution of charges to cost-plus contracts, 533
treatment under cost-plus contracts, 531
Posting,
charges and credits to stock records, 239
from purchase record, 245
labor reports to,
cost sheets, 225
pay-roll and cost records, 125
material reports, 97, 224, 225
to finished stock controlling accounts, 324
to ledger from pay-roll analysis, 262, 264
to part-finished stock controlling accounts, 322, 323
to raw material controlling accounts, 317, 318
to work in process controlling accounts, 319, 320
Power department, examination of, 426
Power, light, heat,
expense, distribution of, 141, 193-195
Form, 194
inventory, power plant, 194
Predetermined costs (See "Estimated costs")
Premium plan, wage system (See also "Wage systems, premium")
Premiums for life insurance,
treatment under cost-plus contracts, 523
Price lists, quotations and records, 71, 72
Pricing raw material, 232
Prime-cost method, overhead distribution, 166-169
advantages, 168
conditions under which inapplicable, 169
disadvantages, 168
rate, calculation of, 167
Principles of cost-finding,
application of, 10, 11
Process cost records (See "Cost sheets")
Process method of cost-finding, 29-34
and order method, 24-34
chart showing application to industries, 33
applied to,
boot and shoe plants, 28
chemical manufacturing plants, 31
coal mining, 32
foodstuffs, manufacture of, 32
foundries, 30

Process method of cost-finding—*Continued*
applied to—*Continued*
garment manufacturing plants, 27
ice manufacturing plants, 32
paint and varnish manufacturing plants, 31
paper mills, 30
plating shops, 26
rubber and celluloid manufacturing plants, 31
straw and felt hat plants, 27-28
treating departments, 32
wood-working plants, 32-34
cost sheet, 212-214
Form, 213
distinctive features of, 29, 30
machine-cost method, 30
pay-roll summary, 265
production,
orders, 49
report, 200
summary, 275
Process pay-roll summary, 265
Product,
classification, 40-43, 418, 419, 448
simple method of, 455
cost, when scrap material is utilized, 92
designation of, 45
disposition of, 207
progress of, shown on production report, 201
standard, orders for, 50-52
Production,
and shipments, statement of, 355
Form, 356
charging to stock, 409
costs, and estimated costs, accounts showing difference between, 463
crediting, 408
manager, reports to, 365
orders, 48-52, 55-64 (See also "Orders (factory), production")
recording, 304, 305
reporting,
method of, 198-209
time of, 206
reports,
defective work, 204-206
Form, 205
examining, 209
factory order used as, 59-61, 201
filing, 209
form of, 198
handling, procedure in, 207-209
labor reports used as, 204
material reports used as, 203, 204
order method of cost-finding, 200
preparing, 207
process method of cost-finding, 200
progress of product, 201
purpose of, 198
recording costs, 209
simple form of, 199, 200
Form, 199
summarized, 305
tag and coupon, 202, 203
statement of, 355, 366, 368
Forms, 356, 367, 369
summary, 274, 275
Form, 274
process method, 275
Productive departments (See "Departments, productive")
Productive labor (See "Labor, productive")
Productive-labor-cost method, overhead distribution, 169-171
applicability of, 170, 171
rate, calculation of, 169, 170
Productive-labor-hours method, overhead distribution, 171-173
applicability and limitations, 173
rate, calculation of, 171, 172
Product method of cost-finding, 29
(See also "Process method of cost-finding")
Profit and loss statement, 342
illustration of, 302
preparation of 301, 302, 306
Profit-sharing wage system, 106, 107
Progressive cost sheet, 221
Form, 222
Proving inventory balances, 306, 307

Purchase,
analysis, 245
invoices,
adjustments on voucher register, 254
entering in voucher register, 247
listing and classifying, 247
Forms, 247, 248
method of handling, 244, 245
posting from purchase record, 245
reports supporting, 244
stamping, 244, 245
Form, 244
journal, 245
orders (See "Orders, purchase")
record, 245
Form, 246
combined with voucher register, 254
posting from, 245
requisition, 66-68 (See also "Requisition, purchase")
Purchasing department,
examination of, 430
reports to, 361-365
maximum and minimum quantities, 365
Form, 366
merchandise purchases, 362
Form, 363
obsolete raw materials, 365
Form, 364

Q

Quantities,
designation of, 48, 49
maximum and minimum of stock, 67

R

Rates,
depreciation, 145-153 (See also "Depreciation")
overhead distribution (See "Overhead.")
overhead distribution methods, 166-184
adjustment to changed conditions, 181, 182
fixed and fluctuating, 179-181
machine-rate, 174-177
miscellaneous, 178, 179
prime-cost, 167
productive-labor-cost, 169, 170
productive-labor-hours, 171-172
sold-hours method, 177, 178
records, 119, 120 (See also "Wage rate records")
Form, 120
Raw material,
controlling accounts, 306, 307, 316
inventory pricing, 388
records (See "Stock records")
requirements, examination of, 429
standardization of costs, 484
storeroom, 316, 471
verification of estimated costs, 471
Real estate investment,
treatment under cost-plus contracts, 539
Rebates, special, 21
Rebuilding and renovating,
treatment under cost-plus contracts, 499
Receipt book, 72, 73
Receiving,
department, examination of, 431
record, 72, 73
Form, 73
Recommendations of cost conference as to cost-plus contracts, 487-494
Records,
control of cost (See "Control of cost records")
cost (See "Cost sheets," "Stock records")
cost summarizing (See "Cost summarizing records")
design of, 411
overhead distribution (See "Overhead")
stock (See "Stock records")
Register,
of purchase orders, 70
Form, 71

Register—*Continued*
of sales and costs, 286-288
Form, 287
Rent,
distribution of, 136
fixed charge, 190, 191
Form, 191
Rental charges,
treatment under cost-plus contracts, 535
Repairmen,
charging time of, 188
Repair shops, cost-finding method applicable to, 26
Repairs to product, 52
Reports (See also "Statements")
design of, 411
executive, interlocking and agreeing, 376
labor (See "Labor, productive reports")
material (See "Material, reports")
on method of installing cost system, 417
production (See "Production")
Requisition,
material, 82-84
Form, 83
bill of, used as, 84-86
Form, 85
factory order combined with, 59, 60, 84
stock transfers, 269
summary of, 266-269
Form, 267
purchase, 66-68
Form, 69
combined with purchase order, 70
disposition of, 27
prepared by, 67, 68
Reserves,
chargeable to cost-plus contracts, 539
Return credit record, 283-285
Forms, 284, 285
Returns summary, 285, 286
Royalty,
treatment under cost-plus contracts, 535
Rubber and celluloid plants, cost-finding method applicable to, 31

S

Salaries,
clerks', charging overhead, reports for, 189, 190
summary of, 265
treatment under cost-plus contracts, 518
Sales,
accounting for, 295
and cost of sales statement, 355, 358
Forms, 357, 359, 360
confidential cost information, 280
costing of, 409
department,
crediting work done for, 288
examination of, 419
reports to, 352
orders (See "Orders, sales")
records, 276-280
Forms, 278, 279
cost of sales combined with shipping and billing records, 276-281
Forms, 278, 279
estimated costs entered on, 478
return credit, 283-285
Forms, 284, 285
special allowances to customers, 283-285
summarizing cost of, 276-288
analysis of sales and costs, 286-288
Form, 287
cost of returns summary, 285, 286
cost of sales summary, 283, 464
Form, 463
returns summary, 285, 286
sales records, shipping and billing records combined with, 276-281
Forms, 277, 278, 279
sales summary, 281-283
Form, 282

Salesmen's expenses,
statement of, 352
Form, 354
Sample expense, 379
Scrap or waste material,
applying value of to product, 92
charged to factory overhead, 127-129, 186, 187
direct material charge, 127, 128
stock record, 128
tools, cost-plus work, 508
treatment under cost-plus contracts, 536
utilization of, 128, 129
Selling expenses, 18
treatment under cost-plus contracts, 536
Selling price, 19, 20
based on,
estimated costs, 181, 228
uniform cost methods, 481, 482
cost-sheets basis for establishing, 211
deductions allowed from, 21-23
relation to cost elements, 20
Form, 20
uniform, 12
Semi-finished goods stock records, 238
Services of expert,
when chargeable to cost-plus contracts, 539
Shipping,
department, examination of, 428
orders (See "Orders, shipping")
Shipments,
costing of, 409
statement of, 355
Form, 356
Shortages,
treatment under cost-plus contracts, 503
Sold-hour method, overhead distribution, 177, 178
Spare parts,
cost-plus contracts, 505
Special-order method of cost-finding, 25 (See also "Order method of cost-finding")
Specifications,
treatment of changes in, under cost-plus contracts, 537
Standardization of production,
cost systems provide data for, 10
Standard operation, wage system, 105
Starting a cost system (See "Cost systems")
Statements,
chart of factory and financial, 374
comparative balance sheet, 339
Form, 342
comparative merchandise inventory, 349
Form, 350
costs and production, 366
Form, 367
examination of factory and financial, 437-438
factory expenses, 370
Form, 371
financial, 298, 299, 338-376
kinds of, 338
labor statistics and costs, 368
Form, 369
machine costs, 371
Form, 372
manufacturing, 345-348
Form, 347
method of,
filing, 375
preparing, 452
presenting, 373
need of comparative analytical, 406
obsolete stock, 361
Form, 362
plant and equipment charges, 349
preparation of, 338
factory and financial, 410
production and shipments, 355
Form, 356
profit and loss, 342
illustration, 302
preparation of, 301, 302, 306
reports to purchasing department, maximum and minimum quantities, 365
Form, 366

Statements—*Continued*
reports to purchasing department —*Continued*
merchandise purchases, 362
Form, 363
obsolete raw materials, 365
Form, 364
sales and cost of sales, 355, 358
Forms, 357, 359, 360
sales department reports, 352
salesmen's work, 353
Form, 354
style and ruling, 375
time of presentation, 376
trading, 348
Stint plan, wage system, 105
Stock,
available for unfilled orders, record of, 235, 236
Form, 237
charging production to, 409
distributing, wage system, 106
maximum and minimum quantities of, 67
obsolete,
filing and disposition of records, 241
statement of, 361
Form, 362
pricing, methods of, 232
transfers, summary of, 269
Stock records, 78-82, 231-241
Form, 78
adjustments of, 232
classification of, 231
consignment, 236
designing and verifying, 81, 82
effectiveness of, 80
finished parts, 234
finished stock, 234
form of, 240, 241
functions of, 80, 81
inventory, perpetual, 81, 231
invoices used as, 238
material sent to outside contractors, 238
method of keeping, 231, 232
obsolete stock, 241
procedure in handling, 238-241
entering inventory balances, 239
filing, 241
posting charges and credits, 239
testing, proving, and adjusting, 239, 240
raw material, 233
reference numbers and letters, 80
reports furnishing data for, 239
semi-finished goods, 238
separate for each storeroom, 82
simple types of, 234, 235
Forms, 235, 236
stock available for unfilled orders, 235, 236
Form, 237
work in process, 233
Storerooms,
charging overhead, 91, 92
department, examination of, 431
departmental, stock records for, 233
ledger accounts,
proof of entries, 445
location and arrangement of, 80
order (See "Requisition, material")
product classification, aid in establishing, 43
raw material, 316, 471
controlling accounts for, 397
recording transfers of material from, 269
stock records for, 82
Storing material, 77, 407
Sub-production orders, 49
Subsidiary records (See "Stock records")
proving, 410
Summarizing records (See "Cost summarizing records")
Summary of,
cost-finding methods, 34
chart, 33
cost summarizing records, chart showing, 292
defective work costs, 272
departmental,
material used, 269

Summary of—*Continued*
departmental—*Continued*
transfers of labor, 269, 270
transfers of material, 269
departmental classification, chart, 41
factory orders, chart, 56
handling material and material reports, chart showing, 95
material received, 257-259
Form, 258
material requisitions, 266-269
Form, 267
combined with distribution record, 268
method of compiling cost sheets, chart showing, 230
overhead distribution, 272-274
Form, 273
chart, 183
reports, chart showing, 197
production, 274, 275
Form, 274
process method, 275
productive labor reports, chart showing, 121
salaries, 265
shop order costs, 270-272
Form, 271
stock transfers, 269
Summary record, 254-257
Form, 256
Superintendent,
charging time of, 132, 133, 189
reports to, 365
salaries entered on separate record, 265
Supervisors,
charging time of, 132, 189
salaries entered on separate record, 265
Supplies,
miscellaneous,
charging to overhead, 127, 186-188
treatment under cost-plus contracts, 503
Suspension of government contracts, 540-549 (See also "Government contracts, cancellation of")
Sweepers, charging time of, 132, 188

T

Tabulating machines, 226
Tag and coupon system,
cost sheet, 215, 216
Form, 216
inventory method, 384
production order and report, 202, 203
Tally sheet, 259
Taxes,
charging to overhead, 137
excess profit,
treatment under cost-plus contracts, 524
fixed charge, 190, 191
income, treatment under cost-plus contracts, 524
treatment under cost-plus contracts, 521, 524
Testing expense,
treatment under cost-plus contracts, 536
Time,
charging to overhead, 188-190
helpers, sweepers, truckers, charging of, 132, 188
inspection, charging of, 133, 189
lost and idle,
charging of, 131, 188
treatment under cost-plus contracts, 514
reports, 115-117
Forms, 114, 115, 116
superintendence, charging of, 132, 133, 189
tickets, 122, 123
Tool room, 396
Tools,
and dies, perishable,
depreciation charged to overhead, 187
depreciation rates, 150, 152, 153
direct charge, 129
fixing responsibility for, 187

Tools—*Continued*
and dies, perishable—*Continued*
indirect charge, 129, 187
reports and records of, 187
classification under cost-plus contracts, 508
considered as plant assets, 396
controls of, 397
identification of, 513
method of,
handling and storing, 510
Form, 511
safeguarding, 396
storage, 510
perishable, treatment under cost-plus contracts, 512
repairs and replacements on cost-plus work, 513
salvage on cost-plus work, 512
treatment of scrap value on cost-plus work, 508
treatment under cost-plus contracts, 507-509
Total costs,
verification of, estimating cost systems, 462
Forms, 463, 464
Trade associations,
efficiency progress through, 11
uniform cost-finding, outgrowth of, 11
Trading business, cost systems for, 401
Trading statement, 348
Training employees, expense of,
treatment under cost-plus contracts, 536
Treating departments, cost-finding method applicable to, 32
Trial balance, preparing and proving, 410
Truckers, charging time of, 132, 188

U

Uniform cost methods (See "Cost-methods, uniform")
"Uniform cost system" impracticable, 12, 481
Unit method of figuring costs, 455
conditions to which applicable, 456
Units,
standardized, advantages of, 49

V

Valuation,
closing inventory, 451
plant assets, 391
Verbal orders, inadequacy of, 45, 46
Verification of estimated costs (See "Estimating cost systems")
Voucher,
accounts payable (See "Accounts payable voucher")
journal, 288
Form, 289
Voucher check, 249
Voucher register, 250, 251
Forms, 252, 253
advantages and disadvantages, 251
analysis record supplementary to, 254-257
Form, 256
combined with purchase record, 254
invoice adjustments on, 254
posting from, 251
purchase record and purchase ledger combined, 250

W

Wages,
additional for overtime, charging of, 131
deductions from, on pay-roll, 259
rate,
records, 119, 120
Form, 120
table, 124
Wage systems,
bases of, 98, 99
bonus, 104-106
differential, 104
direct charge, 130
Gantt, 104, 105
indirect charge, 130
labor reports used as production reports, 204

Wage systems—*Continued*
bonus—*Continued*
simple form of, 104
stint, 105
treatment under cost-plus contracts, 519
treatment when in the nature of gifts, 130, 131
contract, 106
day-rate, 99, 100
applicablity of, 100
disadvantages of, 99, 100
differential piece-rate plan, 103
gain-sharing, 105
kinds of, 98-107
merit, 105
piece-rate,
labor reports used as production reports, 204
piece-work, 100-103
dissatisfaction arising from, 100-102
rate fixing, difficulties of, 101, 102
rates, method of fixing, 102, 103
premium, 104
introduction of, 105, 106
labor reports used as production reports, 204
time rate, basis of, 104
profit-sharing, 106-107
standard operation, 105
stock-distributing, 106
Waiting time,
treatment under cost-plus contracts, 515
Welfare work,
treatment under cost-plus contracts, 536
Wood-working plants,
cost-finding methods applicable to, 28, 32-34
examination of, 425
Working capital,
interest on, chargeable to cost-plus contracts, 526
Work in process,
ascertaining value of, 233
checking cost sheet figures, 239, 240
controlling accounts, 307, 308, 318, 319
Form, 321
posting to, 319, 320
special and standard products, 318
cost sheets constitute inventory of, 215, 233
inventory,
pricing of, 388
sheet,
Form, 380
records, method of handling, 446
stock records, 233
Written factory orders, 46, 47

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